BEYOND "LOOK & LEARN":

Investigating, Implementing and Evaluating Interactive Learning Strategies for Young Children in Museums

1998

QUT – Industry Collaborative Research Project

Project Partners:

QUT, Queensland Art Gallery, Queensland Museum, Sciencentre, Global **Arts** Link

Project goals:

Beyond Look & Learn: Investigating, implementing and evaluating interactive programs for promoting young children's learning in museums aims to establish policies and practices which strengthen the potential for young children's leaming in museums by:

- documenting the characteristics of young children as learners in museums;
- identifying social interactions which promote young children's learning in museums;
- analysing museum policies in relation to young children's learning; and
- developing strategies for building strong links between museums, schools and families.

Project activities:

Case studies of young children's learning in each museum
Front – end planning for children's participation in museum exhibitions
On-site evaluation of visitor response (young children, families, school visitors)
Policy review
Training of on-site research and design teams

Project Team:

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CHAPTER 1

LITERATURE REVIEW

1. LITERATURE REVIEW

Background

Young children have long been visitors to museums but few studies have considered the impact of these experiences on either the children or the museum. In the past decade, attention has been focussed upon visitor experiences in museums and studies have been undertaken to assess demographic, cultural and personal factors. Most recently, the spotlight has focussed on the educational impact of museum visits yet much of the research has examined the educational benefit for school age children with little emphasis on the experience of young children.

In 1997 and 1998, museum educators and administrators from four institutions joined with researchers at the Centre for Applied Studies in Early Childhood at Queensland University of Technology to form a collaborative team to examine more closely the experience of young children when they visit museums. The team was comprised of staff from Queensland University of Technology, the Queensland Art Gallery (art museum), the Queensland Museum (natural and social history museum), the Queensland Sciencentre (interactive science and technology centre) and Global Arts Link (visual arts and social history museum). The team developed a set of questions and a systematic approach to gathering information about young children's learning in various museum environments. To accommodate a process of collaborative learning and shared decision making, the team met on various occasions over the year and undertook research training (see calendar of activities – Appendix **A).**

The main aims of the project were to examine how museums could establish policies and practices that would strengthen the potential for young children's learning by:

- documenting the characteristics of young children as learners in museums;
- identifying social interactions which promote young children's learning in museums;
- analysing museum policies in relation to young children's learning; and
- developing strategies for building strong links between museums, schools and families.

From the outset, the team considered that young children's learning in museums would be enhanced by a variety of interactive strategies. The project name - "Beyond **'Look** and Learn': Investigating, implementing and evaluating interactive programs for promoting young children's learning in museum settings" – was chosen to deliberately focus attention on interactive learning and to highlight dynamic, active approaches to learning in museum environments.

Literature Review

Learning in museums: International goals and directions

The scholarly literature on learning in museums is still in its infancy. Though museums have long espoused an educational mission, there has been little systematic research conducted in this area until relatively recently. Falk and Dierking (1992) claim that the agenda for educational research in museums still remains to be established. They indicate that new initiatives in this area should focus on basic research that may yield generalisable results instead of evaluation studies that have dominated the field.

Any scan of the museums education and visitor studies literature will yield a range of evaluation reports which showcase the activities of a single museum to record the

results of a special project or on-going activity designed to improve learning with the use of museum collections. These reports of small-scale case studies have been useful to the field in that they show innovations in practice, but the studies are often idiosyncratic in their data gathering and reporting methods.

Global mission for museum learning

A reappraisal of the mission and direction of museums has sparked the current surge of interest in museum research on visitor learning. In 1984, the American Association of Museums reported on directions for museums in the next century. Their comprehensive report attended to many issues in museum communities and focused strategically on the building of a framework for learning in museums. **AAM** (1984: 60 – 70) indicated that this would require five concurrent activities:

- a re-examination of the educational function in the internal structure of museums,
- a reconsideration of the power of exhibits to communicate,
- a commitment to research into museum learning,
- a new definition of the relationship of museums and schools, and
- a clearer recognition of the special responsibilities of museums to the independent learning needs of both children and adults.

In the United Kingdom, a report of similar status was prepared by the Department of National Heritage in 1997. This report set twelve targets for the development of a concerted effort to improve the learning potential within museums (Anderson, 1997):

a. to develop museums as learning organisations with education central to their purpose;
b. to utilise the whole public dimension of museums for education;
c. to develop educational capabilities of staff, volunteers and others who work for the museum;
d. to make research and evaluation of public learning an integral part of museum practice;
e. to support visitor learning at every stage of life through informal learning, formal learning and training;
f. to make museums accessible to the widest possible audience;
g. to develop the skills of museum learning in other sectors of education;

h. to collaborate with different agencies and institutions which share museum objectives;
i. to ensure that museum learning is available in every area of the country;
j. to establish the infrastructure that is required at a national level to support development of museum education;
k. to commit the resources that are required for growth; and
l. to make museums **part** of the life-blood of society.

These ambitious goals for the transformation of museum culture may be shared by many who work in Australian museums, yet it is not possible to locate any firm commitment to a national strategy through the professional association web site (http://www.amol.org.au). Likewise, we did not locate a comparable document outlining Australia's national goals for learning in museums during the course of our project.

It would appear that museums worldwide are focusing attention on becoming more relevant to the societies and communities within which they are located. Once considered sites for researching collections with highly qualified scholars working as curators, museums are now turning attention to focus as well on how and what learning occurs in their exhibits and programs. The commitment to learning involves a reshaping of museum practices and policies with an emphasis on lifelong education and community partnerships.

One of the key partnerships forged over the past decade is the linking of university researchers from education and psychology faculties with museum curators, designers and administrators. This collaboration has been influential in building a mutually beneficial climate for the investigation of learning within the museum context. Recognising that it would not be possible, desirable or appropriate to simply adopt a formal school based learning research agenda in a museum community, researchers

have worked collaboratively with museum staff to formulate an agenda for acquiring information on visitor learning. Falk and Dierking's (1990) work signalled that the agenda for research should not focus narrowly on cognitive outcomes, as they found there were numerous social and affective gains which accrued from museum visits.

Framework for Museum Research

Falk and Dierking (1992) propose a comprehensive framework for understanding people's museum experiences. This framework, the Interactive Experience Model, represents a dynamic process that occurs at the intersection of three overlapping contexts, each of which influences a visitor's museum learning experience. These contexts are: *personal* – the expectations and anticipated outcomes each person has for the visit; *social* – the people visitors come into contact with in the museum; and *physical* – the museum environment, including the building structure and the type of exhibits.

Theoretical perspectives on museum research

The problem with learning

Leading museum learning researchers emphasise the importance of theoretical foundations for studies of visitor learning. Paris (1996: 4) indicates that a strong theoretical framework is required to act as a "linchpin" to connect basic and applied research in museums. Within the museum learning literature, there exists a spectrum of possible theoretical frameworks to explain how the visitor makes sense of the museum and its exhibits. Even so, there is a lack of consensus about how best to identify and examine learning in the museum context. As Paris (1996: 3) indicates, this is a vexing issue for a variety of reasons: the lack of consensus about definitions of learning, the uneven acceptance of learning in the mission and activities of

museums, and the extensive range of behaviours, knowledge, skills and attitudes included in the study of learning in museums.

To date, studies on informal learning in museums may best be classified as descriptive visitor studies or descriptive museum environment studies (Paris, 1996). To expand the focus on learning in museum various interpretations of learning theories have been applied in studies in museums. Broadly categorised, these include cognitive, socio-cultural, aesthetic, motivational and collaborative learning theories.

The *cognitive* perspective on learning in museums is encompassed in research that applies a constructivist lens to learning episodes. Constructivisim may be defined as the way in which learners construct knowledge through interaction with objects and people (Hein, 1995; Jacob, 1992; Jeffrey-Clay, 1998). This view has its roots in the works of psychologists Jean Piaget and Lev Vygotsky. Researchers who work within a cognitive framework focus both on the learners' factual accumulation of information (cognition) and their disposition to learn (affect). The acquisition of discipline specific knowledge is of interest to this research stream, but equally there is consideration given to the ways in which information is acquired.

Socio-cultural perspectives on museum learning emphasise meaning-making events that occur as visitors interact with tools, signs, symbols and activities in the context of the museum and its exhibits (Schauble, Leinhardt and Martin, 1998). Socio-cultural views focus not on the content of the visitor's knowledge, but on the processes of their learning, particularly the ways in which they interact and use the museum (Allen, 1998). Jensen (1994) used this framework to study children's perceptions of their museum experiences and found their background, interest and desire for autonomy were strong factors in determining their attitudes about museums. She also

found the family played a vital role in helping children become familiar and comfortable within the museum. Many researchers who use this theoretical framework have been influenced by the work of Lave and Wegner (1991) who define learning as situated in a community of practice where participants share a common purpose, identity and motivation. Within the museum context, socio-cultural theories are used widely to examine various phenomena including the ways in which groups use the venue, become inducted into museum culture and gain knowledge from the collections.

Aesthetic theories focus on the affective, emotional and pleasurable experiences and activities of learners (Housen, 1992; Kindler, 1998). Used largely in art museums, this theoretical view assists with making judgements about the cognitive (factual knowledge) and non-cognitive (affective, social and emotional) dimensions of museum visits. This is not a robust area of research but is one that is very important for early childhood researchers, as it indicates some of the important affective dimensions of learning inherent in young visitors.

Motivation theories are used by various researchers (e.g., Paris, 1998, Csikzentmihalyi and Hermanson, 1995) to indicate that visitors use various intrinsic and personal processes to give direction to their learning in a museum setting. Paris (1998) and Perry (1993) note that the motivators for learning in museums include the construction of personal meaning, the option to make choices, the willingness to accept challenges, the capacity to take control, the opportunity to work in collaboration and positive consequences (benefits) for action.

Collaborative theories are included in many of the theories mentioned above. For example, co-construction of knowledge (where a more knowledgable person assists a

novice) is widely considered to be essential in informal learning and is a component of cognitive, socio-cultural and motivational views on learning (Litwak, 1993). This notion of collaboration need not be considered only as **a** two-way person to person interaction, but may also be seen as one where the curator or designer provides prompts or supports (via text, room brochures or exhibition design and installation) to the learner-visitor. **A** second dimension of collaborative learning involves institutional collaboration for the benefit of learners, as in school-museum links or family-museum links (Gardner, 1991, Piscitelli, 1988).

Researching young children as learners in the museum: Family and school visits

As a cohort of the museum audience, young children are largely ignored in research studies but they are mentioned frequently as part of a family group. **A** growing number of studies on families have been undertaken in museums, particularly science museums and children's museums, and these focus on policy issues (such as access and use) and design issues (such as holding power and attractiveness of museum exhibits) (Dierking and Falk, 1994; Leichter, Hensel and Larsen, 1989; Borun, Cleghorn and Garfield, 1995). McManus (1994) and Piscitelli (1991) have identified various strategies used by families to enhance learning in exhibits, including relating the museum exhibit to the child's known life experience and interests. Cohen (1989) indicates that museums have to make special provisions for children and families, including adapted exhibits, special guided tours, toilets, change rooms, menu adaptations and additional shop items, and that these conditions may lead to a more beneficial overall experience for families in the museum context.

As regards the school excursion, most studies have spotlighted the needs of middle school aged children. Young children's group visits to museums are not fully researched. Nonetheless, evidence from the studies of older children indicates that children may learn in a school based museum visit under certain conditions. Preparation for the visit to the museum is viewed universally as an essential element of a successful visit. Anderson & Lucas (1997), Reynolds (1984), McNamee (1987) and Farmer (1995) stress that children and their adult helpers need to be prepared for the visit. Zeller (1987) indicates that the school visit is best conducted as part of the curriculum, not merely as a fill-in activity or an end-of-year special event. Under well-prepared conditions, he indicates that children receive a clear message that such places are valued parts of the community and are serious places for learning. Falk, Martin and Balling (1978) stress that the one-off novel excursion to the museum actually interferes with learning. In a carefully controlled study, they showed that the novelty of the environment prevented children from attending to the exhibits to be explored during their excursion.

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CHAPTER 2

METHODOLOGY

2. METHODOLOGY

Research Problem

Our study was designed to collect baseline data about young visitors' experiences and behaviours in Australian (Queensland) museums, and to examine selected museum's institutional practices and policies with particular regard to young children and their families. As a collaborative team of university researchers and museum personnel, we examined the role of museums and their interactive exhibits as sources of young children's entertainment and education - recognising that a broad definition of education includes cognitive, affective and psychomotor learning outcomes.

Since each visitor's museum experience is unique, it is difficult to measure their learning outcomes - and this problem is particularly evident when trying to examine the learning of young children. Studies conducted since the 1970s have attempted to measure museum visitor learning outcomes using a variety of methodologies to gauge recall of favourite exhibits, response to exhibit design and acquisition of knowledge. As indicated in the literature review, the vast majority of these studies have focused attention on adults or children from middle childhood and adolescence.

This study examined very young children's experience in different museum settings and utilised appropriate methodologies to gather information about learning within the early childhood age group. In addition, the study examined related issues such as school and family visits, the role of explainers, gender effects, the function of interactive components and administrative practices in each of the museum settings.

It was not within the scope of this study to look for effect over time, or the cumulative effectiveness of multiple visits, though these factors are important issues in any examination of visitor learning in a museum context. Given the one year time frame

in which we were operating, and given the scarcity of research data on young children as museum visitors, we sought to establish some reliable means of gathering baseline information about the characteristics of our visitor group in various museum settings. The study was not intended to serve as an evaluation of young children's reactions and responses to various exhibits in museums; instead, this study was designed to provide detailed information about young children as learners in museums. From the outset, the study was designed to yield information that would be useful in more than one museum context.

Central Research Questions

Our research was guided by a set of questions that were initially developed by the chief investigator and modified in collaboration with the team. In each of the venues, we aimed to:

- document the characteristics of young children as audience in museums;
- identify the social interactions which promote young children' learning in museums;
- analyse museum policies in relation to young children's learning; and
- develop strategies for building strong links between museums, schools, and families.

The Collaborative Process: Defining the Study

This collaborative research project, combining early childhood expertise with the specialised knowledge of museum personnel, brought together two distinct groups of professionals to study the experience of young children in museums. From the outset, the research was designed to provide joint decision making opportunities for all parties. Thus, meetings were established to focus on the research questions, to bring together the partners for professional development activities and to tease out the process of conducting research. During these meetings, we reviewed the current knowledge base on young children's learning in museums and examined methods

used by various authors/researchers in conducting behavioural studies, experimental research, audience surveys, evaluation studies, visitor studies and communication design studies. We also examined guidelines for cumculum in preschools to understand professional objectives and standards for promoting learning in this age group (Queensland School Curriculum Council, 1998; Education Department of South Australia, 1996; National Association for the Education of Young Children, 1995).

The collaborative team agreed upon the need to establish a procedure and rationale for gathering observational data on visitors so that our angle of vision and data collection would be consistent across the varied museum settings. We adopted observation methods described in the Preschool Curriculum Guidelines (Queensland School Curriculum Council, 1998): anecdotal records, running records, time samples, photographs, work samples and various other strategies commonly used in early childhood learning environments. While we concurred with the museum research literature that criteria for learning in schools should not be applied directly to museum learning, we agreed that early childhood environments were distinctly different from the types of contexts described and critiqued in the literature. We agreed that preschools, like museums, were designed for informal learning and the selected research methods had proven effective as ways of closely observing and interpreting children's learning in their natural play and learning contexts, without intruding or insisting on formal responses to questions or limited responses to set situations.

Building the Research Team

To ensure a genuine collaborative process was directing our project, a roster of meetings was put forward, and then revised as needs dictated, during the progress of the study. Regular meetings were scheduled, both for the team as a whole, and for the

participants at each of the individual venues. Team meetings were difficult to co-ordinate, due to problems with finding a mutually convenient time for many different participants, all of whom had demanding and busy schedules.

At team meetings, we worked on concepts of museum research, as well as a generous sharing of ideas, perspectives, and experiences in the different venues. One full day was devoted to a professional development workshop, led by Professor Scott Paris, our overseas consultant from the University of Michigan. On this day, theories of learning were explored, as well as practical exercises in collecting and analysing data.

Meetings with the participants at their individual institutions provided opportunities to refine methods and schedules for data collection, as well as further discussion and exchange of ideas on matters of policy, organisational factors and historical information. (See Appendix **A** for meeting schedule.)

In addition to the research team meetings, we met with museum administrators on various occasions to provide information about the progress of the project. There were several informal meetings with administrators in the museums and one formal meeting was held with senior administrators at the QUT Centre for Applied Studies in Early Childhood.

Selecting a Focus

In each of the venues, museum staff specified what aspects of their programs or practices they wished to investigate further, and we designed data collection strategies and schedules with those specific issues in mind. The Sciencentre was interested in a close examination of children's interactions with their "ScienceSpot" early childhood exhibit and program. The Queensland Museum chose to focus on young children's experiences in weekend family visits, holiday programs, and their new interactive

exhibit, ""Endangered Species"". The Queensland **Art** Gallery proposed to observe young children's school visits in three different exhibits: firstly, in the special exhibition of works by indigenous artist Emily Kngwarreye, at the specifically designed children's exhibition "Portraits are People Pictures" and at their school holiday exhibit "Scary Monsters". Global Arts Link invited us to participate in the front end planning stages of the early childhood gallery space, "Lottie's Place", in their new arts centre.

Refining the Research Question:

Exploring Social and Environmental Factors Affecting Young Children's Learning

As we began to design our focus on children's learning in specific museum exhibits, considerable interest centred on the following issues:

- How do adults support and/or discourage children's learning in museums?
- How do museum programs and exhibits help/hinder adults as they support/discourage children's learning?
- Which features in the museum environment and in exhibits support/hinder children's learning?

In order to investigate such questions, it became obvious that our definition of learning was vitally important. As a team, we settled on a tentative list of indicators which enabled us to narrow the focus of our research, and ensured some commonalties both in our observations and consequent analysis. Our initial definition of learning behaviours was not exhaustive and was adjusted throughout the study. We used a framework of learning indicators from other museum researchers (Paris, 1998; Schauble, Leinhardt and Martin, 1998) to guide our thinking and further developed the list as a team (see below).

There is currently a widespread interest in research on learning in museums and other informal environments (Museum Learning Collaborative, 1999). We considered two possible conceptual frameworks for our research agenda: 1.) ethnographic research to study visitor behaviour in depth or 2.) the identification of indicators of successful museum experiences for young children. In the final analysis, we designed the project to understand both of these objectives: how young children experienced museums and indicators of exhibits that foster learning in children's museum experiences.

As a team, we were interested to document the lived experience of young children as visitors to museums. Thus, as part of our research, we recorded the natural experience of young children in various museum environments and wrote them up as case studies. We used traditional observational strategies from ethnography and classroom research to gather information on children's activities, speech, interactions and relationships. From our analysis of these cases, we built up a picture of young children's active engagement in learning in museums by adding to Schauble, Leinhardt and Martin's (1997) list:

playing with interactives;
commenting on works/objects/exhibits;
exclaiming/reacting;
talking with other children;
talking with adults;
pointing;
looking;
stopping;
asking;
answering;
solving problems;
trying;
revisiting;
comparing;
noticing;
inviting another to interact;
reading labels;
watching (onlooker);
recalling;
using vocabulary.

Designing the Case Studies

We trialed and adapted a number of strategies for data collection, **and** combined these methodologies to build as detailed a picture as was possible within the scope of the study. From the outset, we decided to gather baseline data on how young children learn in Australian museums and our data collection strategies included field notes, journal entries, running records, anecdotal records, time samples, checklists, rating scales, photographs, and interviews.

A number of conceptual features that constitute ethnographic research helped to define the various methods which were employed in this particular form of case study, including a holistic perspective, naturalistic orientation, context sensitivity, importance placed on the participants' perspectives, rich, descriptive data, and the discovery of meaning and understanding as the research progresses (Goodwin & Goodwin, 1996).

We carefully conducted studies in each of the venues to explore how young children learn in museums and the degree to which parents/adults facilitate this process. We sampled the exhibits, activities, and educational philosophy of the three museums, noting children's interaction with both the materials in the museum and with the adults who accompany them.

In researching young children's learning, observation is an appropriate and helpful technique which allows the researcher to take detailed field notes, beginning with general, descriptive and broad observations, and then increasingly narrowing the focus and recording more depth. Multiple methods were used for collecting data for this study, and the continual process of choosing data collection strategies and tools was flexible and evolved throughout the study (Goodwin and Goodwin, 1996). The case study data was gathered over a period of eight months through observations in

the three different museum contexts and included descriptions of the physical, interactive and cultural contexts, taken during observations. These notes were supplemented by observer analysis and reflections. In addition, field notes were supplemented with sketches, photographs, checklists, grids, and other records.

We conducted extensive studies of visitors' interest in objects and exhibits, as measured by both spread (number of objects viewed) and duration (length of time spent with object). The young visitors were chosen through the institutions' booking records (for school and group visitors), and the data was collected by the same researcher for the most part. In some instances, it was possible for the staff at the institutions to participate in data collection, and some training was possible, although time and other constraints seemed to make this rarely possible. At this stage of the research, we were not concerned with determining either the content or the specific process of visitor learning. We assumed that the interest shown by the visitor is some indication of the educational effectiveness of the display. The exhibits were observed for their adult and peer interactions, holding power, use of labels, and gender behaviour, indicating an overall picture of what visitors were experiencing.

Interviewing (structured interviewing, group interviews, and unstructured interviewing) allows the researcher to gain insights into others' perspectives about the phenomena under study (Fontana and Frey, 1994). However, our attempts at interviews with young children seemed inappropriate when we attempted a trial at the Queensland **Art** Gallery and we did not attempt this research strategy in the other venues . Some interviews with adults were conducted, although time constraints prevented us from pursuing further this strategy for gathering data.

Collecting the data

At each of the venues we designed tools which would best collect the information we were seeking to explain how young children learn. Our schedule for data gathering sessions was collaboratively negotiated. Where possible, the researcher was consistent across all venues and she worked with interested staff at the data collecting stage. As the tools were trialed, adjustments were made and additional strategies were employed as new requirements arose. In the case of **GAL,** front end planning involved consideration of preliminary plans for the site, minutes from meetings, background information, and other documentation. The following list provides a brief description of the main strategies used to gather information on young children's learning in the selected museums:

Time sampling: This strategy involved observations, usually with a particular focus, which were recorded at a specified time interval - for example, five minute intervals, Time samples were used to acquire information about visitor behaviour and exhibit effectiveness.

Running records: This strategy involved writing **a** detailed descriptive observation of a situation or a person over a selected period of time. This strategy was used in various ways: to follow a specific group of children through their entire experience of the visit, or at times, to record the activities of one specific child during a visit. In our collection of data by this method, we were able to focus on the experience of young children, particularly with regard to their use of time in the orientation to the museum, intensive looking at specific exhibits, exhibit cruising, leave taking from the museum, and time-on-task during the visit.

Anecdotal notes: This strategy involved writing brief notes on children's actions, behaviours, language and interactions focusing on episodes. Children and their

accompanying adult's behaviour and conversation were unobtrusively observed and recorded after the visit. This strategy allowed us to capture many small episodes and to recount them in the data, much as one retells routine daily life episodes at the evening meal.

Checklists: This strategy involved documentation of an individual child's behaviour in specific detail. We devised specific checklists to suit the settings (see Appendix C). We also used an exhibit checklist developed by Rennie and McClafferty (1996), although we found it necessary to make some modifications to this for the art museum.

Photographs: Photographs may capture the dynamic action of the environment and the learner in pictorial form and provide a reference for what can not be **easily** described, or what is not permanent. Photographs may also illustrate behaviours to people in other contexts. We photographed the children in all three settings, in various contexts, and with due consideration to the ethical issues (confidentiality, use of image in public reports) this raises.

Policies and Administrative Records: We gathered various formal policy documents from each of the participating museums. In addition, various records were made available to us including visitor attendance numbers.

Analyzing the data

Transforming our records of behaviours, policies and practices in four museum settings into a useful and generalisable account required rigorous, explicit and formal interrogation of the data collected (Wolcott, 1988). The study did not intend to be definitive. Rather, the research was designed to provide baseline data in a rich, "thick

description" (Geertz, 1973), not a closing chapter, of young children's experiences in museums.

The data was triangulated by placing case study descriptions alongside photographs, policy documentation, children's voices, diagrams of the physical environments, transcripts of person-person and person-object interactions, and administrative records maintained by the institutions. Through our case studies, we captured and represented some young children's museum going episodes and learning experiences.

While we were particularly interested in presenting a descriptive written account of children's visits to museums, we were also interested to identify the nature of young children's learning in museums. To assist with analysis of learning, we devised coding systerns to identify, sort and classify various behaviours that indicated learning might be occurring. **A** number of people (both in the team and in our research centre) examined the data, to verify our classifications and themes.

Interpreting the analyses

All raw data was shared with the relevant institution, with initial readings of the data sent back to participants in each setting, for their verification. In addition, all the collaborative partners examined and discussed the data as it was accumulating. In a large group meeting, the research team examined various samples of data to locate examples of emerging issues of common concern. The following issues were identified for further attention in the second half of the project during data gathering and analysis:

lost opportunities (lack of interaction with child learners),
group sizes (financial affordability versus pleasure in groups),
presence of an adult (personal interaction for co-constructing knowledge),
durability of learning (long lasting outcomes from museum visits),

follow-up (school and home extensions of museum visits), and

gender (differences in behaviour and learning).

The study was directed to a large extent, by the theory that verbal and physical interactions between children and adults will facilitate learning much more fully than will simple observations of exhibits in museum. To that end, we examined each of the settings and the different opportunities provided for young children's interactions - with people, objects, mechanics, and phenomena.

This study was not designed to examine the accuracy or validity of the information as presented in the exhibits. We were not focusing only on what the children were learning (specific content knowledge), but also on how the children were experiencing their visit (process knowledge). Our study provides a glimpse into the Iives of young museum visitors. The emerging picture, as presented in four case studies, shows a dynamic group of young learners encountering new, but alien, worlds.

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CHAPTER 3

CASE STUDIES: OVERVIEW

3. CASE STUDIES

Overview

A case study of each museum is presented in this section of the report. The case studies provide a means of looking at two dimensions of young children's experiences in museums. First, we attempt to paint a big picture of the museum setting and the position of young children as visitors. Having established the broad view, we focus on the experiences of young children and portray their behaviours. We have followed the work of Allen (1998) with our emphasis on "zoom in" and "zoom out" viewpoints to illustrate both the child and the museum.

In compiling the profiles for each of these cases, a number of issues emerged as universal to all venues, and others were specific to a particular venue. In each setting, we were interested in the arrival experience for the children, and how this fitted in with the rest of the visit. We were interested in the behaviours of children and the adults who accompanied them - parents, teachers, and guides. We noted details of the built environment and individual exhibit areas, and issues that arose from children's use of these spaces. In particular, we looked for the interactive components of each of the exhibitions, and how children engaged with both human and mechanistic interactives.

Our analysis of this data is from a socio-cultural position, informed by theories of learning which emphasise interaction (with people and materials) and active engagement in a context (museums) to optimise young children's learning. Such theories encouraged us to look for evidence of meaning making, and to closely examine children's learning processes, not merely their learning outcomes.

The case studies are brief accounts of conditions and episodes for children's learning in the four museums. In the "Findings" chapter, a detailed analysis of children's learning is presented alongside a set of conditions for promoting learning in museums. Each case study is based on evidence collected across 1998.

Case Study Data Base

(See Appendix B for a detailed schedule of data collection.)

Queensland Museum	
"Buzz Week"	group visits
"Endangered Species"	family visits
	policy and organisational documents
Queensland Sciencentre	
Sciencespot	organised program & group visits
	informal family visits
	policy and organisational documents
Queensland **Art** Gallery	
Emily Kngwarreye	group visits
Portraits Are People Pictures	group visits & family visits
	front end planning
Scary Monsters	family visits
	front end planning
	policy and organisational documents
Global **Arts** Link	
Lottie's Place	front end planning
	policy and organisational documents

CHAPTER 4

QUEENSLAND ART GALLERY
CASE STUDY

4. QUEENSLAND ART GALLERY - Case Study

Background

The Queensland Art Gallery (QAG) is situated on the south bank of the Brisbane River in the capital of Queensland. The State commitment to art spans back to 1895, with the National Gallery of Queensland that was housed together with the natural history museum in Bowen Hills. The current Gallery was purpose built as an art museum and has been open for visitors since 1982. QAG is a contemporary design with various outdoor exhibit areas featuring large sculptures. The main entry is through doors on the river side of the building; visitors may enter through the shop or the main doors. The wide foyer area at the entrance has an information desk and a safe storage area. Admission to QAG is free

The interior space of the gallery features a large water mall which runs parallel to the Brisbane River. There are numerous galleries dispersed over three levels in the building. Visitors gain access to the multi-level galleries by using ramps, stairs, lifts or escalator.

In 1987, QAG hosted a three month research project, "Share the Joy!" to document parent and preschooler learning in the museum. This project was initiated by the chief investigator of "Beyond 'Look and Learn"' and results were published in various journals and books (Piscitelli, 1987, 1988, 1991, 1998).

The Current Study

In collaboration with staff from the QAG Access, Education and Regional Services (Public Programs) section, we developed our research plan to examine the learning behaviours of young children (birth - 8 years) visiting the Queensland Art Gallery as part of a pre-booked group or school excursion or as a family visit. During the period

of our study, we observed groups of school children from the following schools: St Martin's (Carina), McGregor State School, Ithaca State School.

Time Frames for Data Gathering at QAG exhibitions

Emily Kngwarreye exhibition, 20 February to 13 April, 1998. We observed early childhood age group visits booked through the gallery education service.

Portraits are People Pictures exhibition, August to September 1998. We observed early childhood age group visits booked through the gallery education service, as well as weekend/holiday visitors and families. University researchers participated in front end planning for the exhibit with designers, museum educators and curators.

Scary Monsters exhibition, December 1998 to February, 1999. This exhibition was presented to the public at the end of our data gathering sessions and we were able to make only limited observations of weekend/holiday visitors and families. University researchers participated in front end planning for the exhibit with designers and museum educators.

Exhibition Observational Method

Researchers either followed a group as they were directed on a tour by a gallery guide, or stationed themselves in a specific exhibition and observed children and their accompanying adults as unobtrusively as possible.

Multiple techniques were employed for data gathering: anecdotal records; time samples; running records; checklists; photographs; visitor behaviour schedule. The data was later coded and analysed by the members of the collaborative team of researchers.

Front End Planning

University staff were invited to participate as early childhood advisers in exhibition planning with a team of staff from QAG. Findings of children's behaviours while visiting the "Emily" exhibition were discussed and considered when planning the ''Portraits are People Pictures" exhibition, which was designed specifically for an early childhood age group. Data from the "Portraits are People Pictures" exhibition were collated and discussed in the planning process for the *"Scary* Monsters" exhibition. At the end of the project, the chief investigator consulted with **QAG** design staff and project officers on interactive exhibit ideas for the 1999 "Indonesian Gold" exhibition.

Focus of research

We were interested in documenting the characteristics of young children **as** learners in the QAG. In addition to making a record of the children's overall conduct as learners and art appreciators, we wanted to identify the social interactions that promoted young children's learning in the gallery, and look for the links between the gallery, schools, and families.

We were interested in appraising relevant QAG policy documents in relation to conditions (policies and practices) which promoted young children's learning.

Description of the case

Policy and Funding

At the beginning of 1998, the Queensland **Art** Gallery did not have a specific policy with regard to young children. Broad statements about visitors are outlined in the QAG Operational Plan and Strategic Plan. In spite of the lack of clear directions

about family and child visitors, the staff in the Access, Education and Regional Services Department provide a range of services including free guided tours, user pays workshops, pre-service teacher seminars, professional development activities for teachers and family activities. Approximately $30,000 was allocated for activities specifically related to young children in 1998; this includes about $25,000 for children's exhibitions and $3000 for the Sunday in the Gallery program.. Rough calculations indicate that staff time on organisation and delivery of services for young children and families occupies the time of approximately one full-time staff member per year (e.g., organising holiday workshops, trustees classes, regional services and preparation for exhibitions). On a conservative calculation, volunteer guides account for a further contribution of about 5000 hours per year devoted to touring this audience group.

Within the gallery, visitor figures are collected globally at the point of entry and it is very difficult to distinguish age groups of visitors. When the gallery receives a booking, data on the group size and approximate age of the visitors can be manually sorted from the records. Thus, all data regarding numbers of visitors and costs of activities are best estimates and should not be taken as fully accurate. Over the period of our project, rough calculations indicate a conservative figure of 50,000 early childhood and family visitors to QAG with about half counted as children and the other half as adults. **As** a result of our questions, QAG has altered the ways in which it collects figures on attendance and there is now a method for identifying children visitors and unbooked groups.

Children's Visits to QAG

During the study period, we observed children's visits to three very different exhibitions at QAG. Our work at QAG was conducted in a collaborative manner with participation of various staff in data gathering, professional development, research

training and front end planning. "Emily Kngwarreye: Alhalkere - Paintings from Utopia" was a large exhibition over several spaces in the gallery, on different levels. There were a number of paintings of various sizes, shapes, and on various surfaces. The work could best be described as abstract, as there were no identifiable graphic representations. A special area, "The Utopia Room", was set up to accompany the exhibition and included photographic images (short videos and continuous projection slides) of the artist at work, as well as some artefacts which provided contextual reference points for the works. The exhibition was hung for a general gallery audience, with no special concessions made for young viewers. School bookings included guides to accompany groups for one hour.

We observed a number of early years (preschool and early primary) school groups who had booked for their children to view this exhibition. Time samples and running records were used as observation tools from the time the children arrived at the gallery to the completion of their visit. In addition to researchers from QUT, Michael Beckmann from QAG also recorded observations during these scheduled sessions. We all encountered difficulties in trying to avoid intruding on the children, and yet being able to observe and listen to them in a natural situation. We asked the teachers to explain to the children who we were, in order to avoid alarming them, but this sometimes had the effect of altering their behaviour and conversation, creating an awkward self-consciousnessin the children.

Some of the preliminary findings from our observations of the "Emily" experience were discussed at the front-end planning stage of the next exhibition that was to be designed specifically with young children in mind.

"Portraits are People Pictures" was designed as a specific children's exhibition and was located on the lower level of the complex in a small gallery space on the water mall level behind the escalators, near the lift and adjacent to the public facilities. A

large open gallery, located next to the exhibition, was used as an activity centre during this exhibition. The exhibition consisted of twenty paintings, prints and sculpture chosen from the QAG permanent Collection, including major works by international (e.g., Renoir) and Australian (e.g., Fullbrook) artists. The space was specifically designed for young children with raised ramps, lower than usual hanging heights, protective perspex/glass shields for sculptures and paintings, and adapted labels. Labels were aimed at children and contained questions which prompted thinking and interaction with the works. **A** number of interactive elements were included and these features encouraged children to touch, feel, listen, look, play and react to the art works. Interactive features included distorted mirrors, silhouette shadow area and sound activated miniature doors. Guided school groups were offered the opportunity to include hands-on drawing workshops as **part** of their visit.

The exhibition was officially opened on a weekend. The opening party was full of fan fare with performers and refreshments for all visitors. **A** glossy **A5** brochure accompanied the exhibition containing full colour images of some of the works and prompts for the children when viewing the portraits. The exhibition was sponsored by a children's clothing company with a small grant.

Teachers were offered a briefing session on a weekday after school. At this session, the QAG Education Officer explained the works, whilst the teachers supped on wine and cheese.

The exhibition was very popular with a high attendance during the week and on weekends. Due to global attendance figures at the time of the exhibition, total child visitor numbers to "Portraits" are hard to isolate from the statistical data, but we would estimate (conservatively) about 30,000 people came to see the show, with children representing about 60% of the total. The exhibition was open during the Out

of the Box festival of early childhood in Brisbane and many visitors came during that time.

Within the "Portraits" exhibition, we recorded observations of children's behaviour by using running records, anecdotal notes, and time samples. We observed school/preschool group visitors and family visitors. After analysing and discussing the information we collected on the "Emily" exhibition, we wanted to gather more specific information with the planned "Portraits" exhibition, and devised and modified some checklists in the hope that more precise data might be collected. We trialed the use of Rennie and McClafferty's (1996) Visitor Behaviour Schedule, but we quickly found that this tool needed to be modified for use in an art museum. We also decided to interview some children, with the intention of determining some of the learning outcomes of their visit, but this proved problematic as the children did not know the researchers well enough to give honest and valid replies to our questions.

''Scary Monsters" was scheduled to coincide with the Christmas school holiday period and was also designed specifically for children, though a little older age group (5 – 12 years), because of concerns for the potentially frightening content of some of the exhibits. It was located on the mezzanine floor of the gallery, in a corridor space, and was designed to recreate the atmosphere of a carnival ghost train. It was a long narrow space, with paintings, ceramics, works on paper, photographs and sculptures from the QAG's permanent Collection chosen to fit the theme of monsters. The designers darkened the space and added plastic bats, spider webs, computer activated lights and sounds to create a unique atmosphere. A brochure was prepared for this exhibition, funded by a children's clothing manufacturer. Other funds were borne by the QAG budget. Preparators from the Queensland Museum assisted with the installation of the soundscape features in this exhibition.

This exhibition was also officially opened to the public with a party, performers and a hands-on workshop. During the school holiday period, the gallery offered a workshop program in conjunction with the exhibition. The user pays workshop was promoted as an opportunity for children to make their own scary monsters. The session was conducted by a local artist, required pre-booking and was restricted to two groups of ten children (aged 7-12).

Although our case study was concentrated primarily on the earlier two exhibitions, we took some observations of children attending the "Scary Monsters'' exhibition during school holidays, using both qualitative and quantitative observation tools. Rennie and McClafferty's (1996) Visitor Behaviour Schedule was used in looking at children's responses to certain art works and aspects of the gallery environment.

General Observations of Children in the Art Museum

We gathered extensive information on children's responses to the QAG and its exhibits. The raw data provides rich descriptions of the lived experience of young children in the museum context. For the purposes of this segment, we provide summary statements with some anecdotal evidence; further details may be requested from the project team.

Overall, it was clear that the experience of going to the QAG was exciting and enjoyable for children. They showed eagerness to enter the doors of the QAG and displayed a fascination with the architectural features of the building. For most (but not all) of the children, their organised school visit was their first encounter with the QAG. In the majority of cases, children's preparation for their visit was well organised by their teachers. For example, in one case, we noted that children had studied indigenous art, had reviewed the catalogue of "Emily Kngwarreye", had

learned to pronounce her surname, and had discussed the conduct expected of them in the QAG.

In the majority of cases, children were accompanied by adequate numbers of adults to enable small groups to work together; this was not universal, though, and sometimes the lack of adult supervisors led to lost opportunities.

We also noted that adult visitors to the QAG were very pleased to see such young children in the museum. In one instance, a group of adults stopped to listen to children's remarks and voluntarily commented to the research team that they were intrigued to see such young children taking an interest in art works in a museum setting.

During the project, Volunteer Guides met booked groups at the main reception area. In most cases, these meetings were confusing experiences for all parties. Children were eager to look at the building and its contents, but Guides and teachers needed time to sort out organisational issues. This generally occurred in the foyer space near the main doors and caused congestion and noise, thus disturbing the information officers, protection services staff and other visitors. Sometimes, the entry into the **QAG** was a prolonged and wasteful time period with up to 15 minutes involved in sorting out organisational issues such as grouping of children, introductions to staff and matters related to conduct. During this period of negotiations and organisational regrouping, children fidgeted, talked, wandered aimlessly and played games. Given that some groups comprised 60 children, there was a high level of kinetic energy caused by the prolonged waiting period.

Once children and Guides were organised, the tour of the relevant exhibit proceeded. In the main, Guides commenced to the specific gallery or exhibit without giving children an introduction to the QAG. Children followed, but their heads were

twisting in all directions as they tried to observe the architectural features of the building.

In many cases, groups of 12 – 15 (or more) visitors were allocated to a Guide. The one hour time frame for the guided tour put limits on possible activities. Guides worked hard to draw children's interest to the works by using strategies such as storytelling, hands-on resources and laminated information panels. Even so, the Guides experienced many problems and suffered from many constraints. First of all, the building itself has a lot of ambient noise caused by the mechanics of the escalators and poor acoustics. Secondly, many Guides were not familiar with the background of their visitor groups and had little time in which to establish some knowledge of the children's understanding of art. Third, many Guides were not familiar with the characteristics of the early childhood age group and had trouble with keeping the children engaged in exchanges of ideas. Finally, Guides and teachers/parents did not have a well developed strategy for working together to make the child's visit a successful one. We surmise that this situation arose due to role ambiguity and lack of time to discuss how best to work cooperatively or to share information about pre-visit activities.

Large numbers of children attended "Portraits are People Pictures" and this caused many problems to the Guides. In addition to the problems stated above, there were severe space constraints in this exhibit. Thus, Guides faced many difficulties in providing eager children with a high quality experience in the exhibit. Even so, many happy faces were seen within the exhibit and the overall experience was one of great delight and happiness. However, one of the main objectives of the exhibit, understanding artistic concepts, was often neglected as some Guides and visiting adults lacked knowledge, skill, ability and training to make the most of the exhibit with the young children.

In spite of these tensions and problems, children showed interest in many aspects of their museum visit. They were particularly intrigued in two aspects of the QAG: the architectural aesthetics and the interactive components of exhibits. Regarding the architecture, we found children sliding their feet on the smooth marble surface of the floor, leaning over the railings in the void (challenging one another to hat dropping games), putting their fingers in the water on the mall. Children's fascination with the environment was not taken up as a potential learning experience by guides, parents or teachers. Instead, children were reprimanded, hurried along or ignored when showing interest in the QAG environment.

With respect of the interactives, the QAG had worked hard to provide young children with a range of interactive experiences related to works of art and these were well regarded by the children (and other visitors). In the Emily Kngwarreye exhibition, children showed interest in seeing the video of the artist at work in the small "Utopia Room". They were intrigued with how Emily worked on her canvasses and astonished at the amount of money she earned for her paintings. Most children visited this space after viewing the art works and they seemed able to make sense of the show through their experience in the "Utopia Room".

In the "Portraits are People Pictures" exhibit, children were excited when they entered the exhibition as evidenced by a high level of interaction amongst themselves, an eagerness to get to the interactives and considerable discussion about the art works. Perhaps one of the most used and exciting elements of the interactive design in this exhibition was a series of small doors cut into the wall. When the visitor opened the door to view the enclosed ***netsuke,*** sound emerged to provide an auditory link between the object and the sound it would make (as in crying baby, snoring man and laughing children).

Children in large groups did not get to view works or use interactive components very satisfactorily. For example, the silhouette interactive was very popular, but children not able to see themselves in shadow form; the interactive required them to work and interact with a partner. Children were unable to draw a silhouette in the adjacent area to the exhibit due to the severe space restrictions. Mirrors used in conjunction with various art works in "Portraits are People Pictures" proved very popular, but no direct link was made with the related art works.

While school groups were very crowded at "Portraits are People Pictures", this was not the case for family visitors. Families made use of the pamphlet publication that accompanied the exhibition and used it to focus children's attention by inviting them to answer questions and, where appropriate, read labels.

Children enjoyed following the footprints on the floor of the gallery to locate the exhibition "Scary Monsters". There was a palpable sense of anticipation as they parted the dark curtain to enter the gallery space. The special effects of plastic bats, spiders, cobwebs and spooky sounds impressed children visiting "Scary Monsters". They noticed some of the installation features and concentrated on the ghoulish theme, building up a heightened excitement in the gallery space, but few children looked at works of art unless prompted by an accompanying adult. The main objective of "Scary Monsters" was to provide entertainment during the Christmas school holidays and the QAG was rewarded for this by very high attendance figures. Family visitors may have been somewhat bemused to see signs near the escalators, foyer and exhibit explaining the rules of the gallery.

"Scary Monsters" was located in a long narrow corridor on an intermediate floor of the QAG. There were many works of art in the exhibition and from our observations we noted that many children walked straight past much of the art. For example, the very popular *netsuke* which had been enjoyed at "Portraits are People Pictures" were

largely ignored, in "Scary Monsters" perhaps due to their position or lack of interactive component. A number of children walked quickly through "Scary Monsters" as if the aim was to get from one end to the other. We heard them exclaim to one another, "Is that it?". Accompanying adults often brought children back into the space and used the room brochure to facilitate looking at the art works. In cases where parents or grandparents had some working knowledge of the art works, they were able to guide children's thinking and focus their attention on the artistic features of the exhibit.

In spite of the limits, teachers and parents indicated to us that they were very pleased to see some exhibits for children in the QAG. They felt the children had positive experience and that they would want to return to the QAG. However, these same adults indicated that they did not know much about art and thus did not have a repertoire of skills to capitalise on the obvious benefits inherent in the **QAG.** In relation to guided tours, teachers and parents were sometimes ambivalent about their roles. In the case of school groups, the teacher's expertise was often not utilised. As organisers of groups of children, teachers could offer Guides a much easier time if they were able to group the children and prepare them for their visit. Teachers also could play some role in shaping learning objectives, guiding children's behaviour and cooperating with guides in the touring.

***Main** Lessons from QAG Observations*

Visitor learning

Our key objective was to gather focused observations on children's behaviour which might show us some indicators that they were learning. We noted the following ways of knowing that children were learning:

playing with interactives,
commenting on works,

exclaiming/reacting in response to art works,
talking with other children,
talking with adults,
pointing to art works or identifying elements of works,
looking at works (circling sculptures, gazing at paintings),
stopping in front of a work,
asking questions,
answering questions,
solving problems,
revisiting works (alone or with friend, teacher or parent),
comparing works,
noticing (objects, materials, signatures, elements, colours),
inviting another to interact,
reading labels,
using pamphlets,
watching others examine art works (onlooker),
recalling the visit,
using artistic vocabulary (line, colour, shape, form, texture, meaning).

Our observations revealed a number of behaviours that indicate learning was occurring, but we are not certain about the depth or durability of the learning experience. As noted earlier, it is difficult for strangers to carry out sustained interviews with children. We noted a need to enlist help of teachers/adults in reporting follow up conversations at home and in school to gauge the overall impact of the art museum visit on the child's overall artistic experience.

From a child's viewpoint, it is obvious to the research team that two key factors could enhance the quality of their visit. First of all, children in this age group seemed to learn best in small groups of six to eight children to one Guide, with additional adults to accompany the smaller group. In this more intimate group, children could hear the Guide and see the respective art work. As well, small groups meant the Guide could listen to the children's responses and sustain a real conversation. The presence of the knowledgeable and interested adult led to sustained engagement of the child with the work of art. In these smaller groups, we also noted that children led other children to look again at art works and to talk about their reactions.

The second factor that seemed to contribute to children's learning was the quality and presence of interactives. We noted that the simple technology was as effective as the more sophisticated technologies. For examples, the various mirrors in "Portraits are People Pictures" were just as popular as the sound activated *netsuke* doors. The room pamphlets were frequently used, especially in family visits, and these proved to be one way of connecting children with the art works in a fun (not didactic) manner. We noted the use of interactives in two of the three exhibitions at QAG and found that the level of engagement was high in the "Portraits are People Pictures" exhibit while children were less involved, and had fewer interactive possibilities, in "Scary Monsters". We also noted that the interactives seemed to work well due to the collaboration of designers with educators and feel this collaboration should be sustained to ensure that the interactives meet the learning potentials of the audience.

Collaboration between QAG and QUT

Collaboration worked well in this setting. From the early stages, staff made time available to get together. A number of meetings were called over the course of the year involving the project team and other members of staff at QAG. The QAG staff showed interest in learning more about the young visitors and became involved in data collection, analysis, and discussion. As time progressed, there was on-going cooperation and the evolution of a shared understanding about the nature of children's learning in art museums.

Recommendations

We make the following recommendations for QAG to consider in relation to policy and practice for young visitors.

CHAPTER 5

QUEENSLAND MUSEUM CASE STUDY

5. QUEENSLAND MUSEUM - Case Study

Background

The Queensland Museum (QM) is situated beside the Queensland Art Gallery on the south bank of the Brisbane River in Brisbane, the capital of Queensland. QM is a contemporary design with a number of outdoor exhibits, including a dinosaur, war tank, and life size sculptures of whales (with accompanying sound installation). The museum building is part of a cultural complex which includes the Queensland **Art** Gallery, Queensland Performing Arts Complex and the State Library. The museum shop adjoins the main entry foyer, and the lifts and stairs which lead down to the education level.

Admission to the QM is free. The numerous public exhibits are over four levels (including the ground level dinosaur garden), accessible by elevators or lifts, with a mezzanine level which houses an extensive permanent reference section, as well as changing exhibits, including ""Endangered Species"" which was selected by QM as the focus of this study.

QM has a long history of collaboration with QUT and has been interested in acquiring further information on their younger visitors, In 1996, an exhibition of children's art, "Together Under One Sun", was hosted by QM and attracted large numbers of visitors. The exhibit was part of a large biennial children's festival, "Out of the Box", and was curated and staffed by QUT School of Early Childhood.

The Current Study

In collaboration with staff from QM education section, we developed our research plan to examine the learning characteristics of young children (3-8 years) visiting the Queensland Museum, Unlike the other venues, the original purpose of this study was to observe family and holiday visitors, not pre-booked school or excursion visits.

However, during the period of our study, a program specifically aimed at young children was scheduled, and we observed a number of groups of children from preschool centres as they participated in this program. In addition, as was the original intention, we observed young children who visited with family or friends, on weekends and in school holiday times.

Dates for Data Gathering at QM Exhibitions

General Exhibitions (including Marine Reptiles, Whales, and the June Holiday program), *26* June-3 July. We observed young children as they visited in the company of adults (family, friends), on weekends and school holidays.

"Buzz Week", 10-14 August. We observed groups of children from a number of preschool centres, who had been pre-booked to participate in the "Buzz Week" program. University researchers were invited to meet with the two staff members who developed and presented this special program for children in the early years, and then observe the program.

"Endangered Species" exhibit, *2* October - December. We observed weekend/holiday visitors, with particular attention to the young children in family groups. University researchers were invited to meet with the design team for this exhibit, and discussed their aims and objectives for this specific exhibit.

Exhibition Observational Method

Researchers tried to station themselves in an inconspicuous position in each exhibit, sometimes moving around the exhibit in order to avoid inhibiting visitors' experiences. They observed the children and the accompanying adults as unobtrusively as possible.

Multiple techniques were employed for data gathering: anecdotal records; time samples; running records; photographs; visitor behaviour schedule; questionnaires. The data was later coded and analysed by members of the collaborative team of researchers.

Front End Planning

University staff met with designers and education officers and discussed their objectives and research interests, particularly with the ""Endangered Species"" exhibit.

Focus of research

We were interested in documenting the characteristics of young children as learners in the museum. In addition to making a record of the children's overall conduct as learners, we wanted to identify the social interactions that promoted young children's learning in the museum, and look for the links between the museum and families.

In addition, we were interested in appraising relevant QM policy documents in relation to conditions that promoted young children's learning. QM education staff participated in the meetings of the collaborative team and Professor Scott Paris's seminar. We were also able to meet with QM staff at the museum on several occasions, although it was seldom possible to meet with a number of those involved at one time. Staff who were responsible for "Buzz Week" did not attend any of the "Beyond Look and Learn" meetings.

Description of the case

Policy and Funding

The Queensland Museum (and its network of museums in regional centres) provides a range of services to visitors, including schools, preschools and families. As well as

group guided tours which can be booked and pre-arranged through schools, there is an extensive outreach program, and schools are also able to borrow exhibits which they can hold at the school on loan. There is a visitor trail which families may obtain on entry, and children were frequently observed using this as they made their way round the museum with an interested adult assisting them.

According to policy documents, up to 95% of visits to museums are made in groups of some sort, the vast majority being family groups. According to 1998 QM Education policy documents, the Queensland Museum aims to develop "enjoyable learning opportunities and activities appropriate to the age, ability, gender, interest and cultural backgrounds of all potential users". Their policy also clearly establishes that education staff are essential members of exhibition project teams.

Children's Visits to QM

During the study period, we observed children's visits to the museum in three different contexts. We began with observing visitors to the general exhibitions, including an advertised holiday program, using this as baseline data. We then observed young children participating in the program which was specifically designed for the preschool age group - ""Buzz Week"". Finally, we observed young children's visits to the exhibit ""Endangered Species"", nominated by the museum staff as the new exhibit on which they wished to focus research into visitor behaviour.

We observed families visiting the museum on weekends and holidays, focussing particularly on exhibits nominated by the museum staff for their interactive components. **An** exhibit of marine reptiles was on the ground floor, and included a short video, information and replicas of turtles, and other sea creatures. One of the interactives in Marine Reptiles was about temperature, and visitors could put their hands into two different small spaces, experiencing the change in temperature. This exhibit was at a height accessible to young children. The Whales exhibit was on the

second level, and featured a viewing platform, from which visitors could look out on the giant whales which hang at the entrance to the museum. This exhibit also included a number of videos, a display of a whale's skeleton at floor level, and photographs in the didactic panels. Other general features of the museum layout were observed, for instance, the giant spider hanging in the void between levels one and two, and the large wall mural of dinosaurs' footprints, hung across from a glass-railed landing. These exhibits were for a general audience, with no special concessions made for a younger audience. At the time of some of these observations, the museum was also advertising a holiday program for children visiting, which included touch tables, interactive wall puzzles, and a "trail" which itemised special individual features of the various exhibits.

We observed a number of groups visiting on weekends and during school holidays, focussing particularly on those groups which included young children. Anecdotal records and running records, as well as time samples, and visitor behaviour schedules were used as observation tools. Researchers from QUT collected this data. Museum staff were unable to join us, due to time and duty constraints. Difficulties were encountered in attempting to closely observe and listen to children's comments unobtrusively. Since we were watching small family groups, our presence was conspicuous in most exhibits. We attempted to address this by informing family groups of our task, but this often created a self-consciousness in all members of the group. Taking photographs was also intrusive, since we were at close quarters to the children we were observing.

Our preliminary findings were shared with the museum education officers, and we met to plan further schedules for data collection. Museum staff did not collect data with us at any time, perhaps partly due to the fact that our observations were not concerned with large group school visits. This possibly made a difference in the times we were able to work together collaboratively.

""Buzz Week"" (10 - 14 August) was a program about insects, their life cycles, and their habitats, which was specifically designed for young children. The development of this program evolved from a teacher's idea and use of costumes that were in the museum's resource collection. Two staff members are employed part-time, and they have conducted the program from its inception. Although this was not **part** of our original research agenda for the museum, the program was brought to our attention since it was being conducted during the time of our study, and we re-scheduled the data collection schedule to accommodate this set of observations.

During "Buzz Week" activities, children come down to the purpose built education rooms, which are on a basement level below the first floor of public exhibits, **As part** of their "Buzz Week" visit, they are encouraged to visit the other parts of the museum before or after the hour they spend in the program. There was no direct connection with the larger public area - it is not physically visible, and the museum staff did not accompany the children through the larger museurn area. University researchers met with the two facilitators, and we collaborated to design a research plan. We talked about the history of "Buzz Week", the objectives of the program, and the possibility of doing a form of action research, as the program evolves from year to year. **A** questionnaire for surveying parents and teachers was also proposed.

In the "Buzz Week" program, the presenters took the children through a structured program, which included story telling, dramatic play, movement, dress-ups, hands on science and drawing. The subject was "Insects" and the children caught and touched live insects, saw them through a large microscope, dressed in costumes, and acted out parts of a story which explores the life-cycle of insects. School and preschool groups booked for 60 minutes with accompanying adults. The cost was low, and children were given an activity (mask-making) to take home, or complete at school when they returned.

Running records and time samples were used as observation tools, as well as a survey that the accompanying adults were asked to complete while attending the program. We attempted some interviewing of children as they sat at the colouring table, and had some degree of success, although encountering the usual difficulties, since we were strangers to the children. This usually meant that we were able to engage a certain personality-types in conversation, but not obtain a cross-section of opinion and reaction.

""Endangered Species"" was designed as general exhibition, with no special concessions made for young children's needs. It was situated on the mezzanine floor, near the reference section and occupied a full gallery space. The focus was on conservation and care for the environment, and the design incorporated a variety of media, technology, and objects. The labels were back-lit, with photographs and text, moving from simple large text to more detailed information in the final paragraphs. A large number of interactive components were included in the exhibit, including touch button displays, "talking head" exhibit, peep-holes, and some live turtles. There were numerous opportunities for children to touch, listen, and play, and items and artefacts of interest were placed at all viewing levels - low on the ground, bench height, and suspended from the ceiling. There was also a sound track that was on a loop and played continuously. The overall lighting and ambience of this exhibit was quite dark, and at times loud (recorded sounds of air and road traffic).

The museum staff asked specifically for this exhibit to be evaluated, since this was their new project for the year of the study, and was to become a permanent exhibit in the museum. In order to ensure that the "Beyond Look and Learn" project looked at as broad a picture as possible, it was agreed that in the museum we would observe family visitors and holiday visits, not the booked school groups. QUT researchers met with the designers, and education officers who developed the "Endangered Species"

concept. This meeting was held after the exhibit was in place, and we discussed their objectives, and possibilities for determining how the exhibit is being used by young children, or what learning we can observe taking place.

Time samples and running records were used as observation tools in this venue. It was difficult for researchers to find a position which was non-intrusive and inconspicuous, but which allowed a view of the room. At times we resorted to watching intensely for small amounts of time, and then retiring to a chair outside the exhibit to write up immediate observations. We also used the Rennie and McClafferty's (1996) Visitor Behaviour Schedule, and found it useful in this setting, particularly if a team of researchers were able to work together. Photographs were also useful in recording behaviours, although the flash was intrusive in this dark setting.

General Observations of Children in the Museum

We gathered extensive information on children's responses to the QM and its exhibits. The raw data provides rich descriptions of the lived experience of young children in the museum context. For the purposes of this segment, we provide summary statements with some anecdotal evidence; further details may be requested from the project team.

Overall, it was clear that children were excited about visiting the museum, and also that there was a noticeable variation in the purpose and intent of young visitors. Some had obvious interest in either all the exhibits, or specific favourites with which they were already familiar. Some were simply accompanying other family or group members, and knew little of the space or place. Others might be said to have been "killing time", on their way elsewhere: "Can we get the city cat now?". And, other young children "led" their accompanying adults around the museum, the adults happy to wander and follow wherever the younger child wished to go. Some adults

interacted constantly with the young children, explaining, pointing out, answering questions, reading didactic panels, talking. Other adults had very little interaction with the young children. In this laissez-faire approach, the adults were happy to read the information themselves and leave the children to wander or run on ahead. In a more moderately structured approach, adults asked children wait while they stopped to read information panels. We also noted an approach where adults found a place to sit while children went to explore exhibits that took their fancy.

We did not observe museum floor staff interacting with visitors. They appeared to be acting strictly in a security capacity, wearing uniforms and pacing different areas. For instance, many visitors walked straight past the touch table situated on the ground level, and did not appear to even notice it. The presence of a museum "explainer" could have drawn visitors' attention to the display, and helped adults by modelling different ways to engage children in activity at the touch table. We also observed the touch table during the holiday program, half the section was not open, there was no museum staff in attendance, and the technology had a sign "Out of Order". As a result, visitors were left to their own devices. Children could play with the puzzles, mazes and other interactives but often there was no adult present to **make** any connections with the scientific concepts.

In the "Buzz Week" program, the children were for the most part attentive, engaged and active in the set program, particularly the hands on components. They all dressed in a costume, and hunted in the dirt tray for live insects. The welcome experience was good. Children were met at the door of the allocated room by presenters who informed them about what to expect, and engaged them in a dynamic conversation. The program was divided into two sections, and the children were similarly divided, so that they all had access to the entire program. We observed children's enthusiasm to participate in both the drama and the microscope activities, and they were active

and busy throughout the program. Adequate numbers of adults accompanied the children, and organisational matters ran smoothly.

Most of the adults who accompanied their children stood aside and watched the museum staff and teachers with the children. They were offered coffee on arrival downstairs, and they often sat and talked with the other adults as they watched their children participating in the large group. They did not engage in the activities themselves, nor engage the children in conversation. However, when we did observe some adults interacting and guiding their children, having an ongoing conversation, and helping children to express what they were learning, the children appeared to be more engaged with the task and stayed for a longer period of time.

The children did not appear to really grasp the concept of the microscope's function - how it made their own insect larger and projected it onto the screen. This did not seem to be of particular interest to them. They appeared more engaged by the experience of actually catching their own insects, and a number of the children were able to name the type of insect they had caught. We noted some distinct gender issues in this program. For instance, although initially invited to choose for themselves, boys were disproportionately allocated the spider and bee costumes, whereas girls were generally encouraged to take the butterfly costumes. In the hands-on activity, the teacher presumed that boys would have no objection, and for the most **part** simply handed them their cup and stick with which to catch their insects. However, she frequently asked girls if they wanted to catch insects, and reassured them that they didn't have to if they preferred not to. Some girls did not participate, but looked on or went to the colouring table. **As** we talked with some children at the colouring table, it was obvious that they did not connect the black outlined insect on the sheet they were colouring with their recent experience of catching insects. Perhaps blank sheets that invited the children to record their own visual thinking about insects might be more appropriate for this age.

Teachers and adults were positive about the experience, and felt the children had a positive experience. We did not observe the children after they left the education rooms, so we are unable to say whether this was a successful introduction to the museum. The physical position of the room where the program was conducted means it is impossible to make links between this and the main part of the museum, but we did not observe children making any obvious connections. We suspect it would have been possible for young children to not realise they were actually at the museum, or that the museum holds a large collection of insects, or how the function of the museum is connected with insects. While this is not the expressed aim of the program, we suspect that for many young children this is their first visit to the museum, and some orientation might have been included in their guided experience.

"Endangered Species" was not designed with any special features for young children, although there was a large interactive component included in the design. **As** in the other general exhibitions, it was our observation that young children's experience in this exhibit was greatly dependent on the adults who accompanied them. With regard to the interactive components, they enjoyed pushing the buttons, but this mostly seemed to fall into the category of "making it work" and they seldom lingered for any additional information or explanation about the subject matter. Most of the information, beyond the visual, was reliant on the text panels that were very wordy, and therefore inaccessible to young children. The exception was the "talking head" explainer, and this appeared to draw the attention of both adults and children. Many of the exhibits were at bench height, above a comfortable height for very young children.

However, some exhibits were deliberately placed at a very low level (e.g. hole in the ground), and sometimes at floor level. Not all of the young children noticed these, since they were not directed to look down, but many did. **Again,** the accompanying adult either built on this experience, often having their attention drawn to the exhibit by the child - or the child was ignored or dismissed, **and** their experience and

knowledge was only marginally extended. Many times, the child was not able to **draw** anyone's attention to what they spotted, and no interactions took place. We observed very few visitors, adults or children, noticing the whale skull that was suspended from the ceiling.

We frequently observed young children reacting to the sound loop by putting their hands over their ears, but they were not, in most cases, further informed as to the significance of this. Adults might notice and look for an explanation for the noise. At times they were unable to locate the source or explanation, and either dismissed it, if the child had moved on, or made **a** guess about the sound.

It is difficult to nominate any particular exhibit as being notably popular with young children. In general, young children not engaged for any length of time with any of the exhibits. If their accompanying adults stopped to read labels in detail, young children were observed wandering off, or tugging on their hands, or gazing around. When an adult (grandparents were frequently observed in this role) did engage with the young child, discussing exhibits, sharing information, and answering questions, the children stayed with the exhibits for a notably longer time.

Main Lessons from QM Observations

Our key objective was to gather focussed observations on children's behaviour that might show us some indicators that they were learning. We noted the following ways of knowing that children were learning:

playing with interactives
commenting on exhibits
exclaiming/reacting in response to what they see
talking with other children
talking with adults
pointing to specific exhibits or parts of displays
looking at exhibits
stopping at an exhibit

asking questions
answering questions
solving problems
Participating in activities (dress-up, catching insects)
trying an interactive (pushing buttons, putting on headphones, etc)
revisiting an exhibit (alone or with a friend/adult)
comparing items (e.g. insects they had caught)
noticing (objects, materials, animals, colours, noises, movement)
inviting another to interact
reading labels
using "trail" pamphlet
watching others looking at exhibit or using interactives (onlooker)
recalling the visit, or features of the visit
using scientific vocabulary (microscope, insect)

Our observations revealed a number of behaviours that indicate that learning was occurring, but we are not certain about the depth or durability of the learning experience. As noted earlier, it is difficult to carry out sustained interviews with very young children if conducted by strangers. We noted a need to enlist the help of teachers/adults in reporting follow-up conversations at home and in school to gauge the overall impact of the museum visit on the child's overall museum experience.

From a child's viewpoint, it is obvious to the research team that key factors could enhance the quality of their visit. The presence of interested adults can lead to a child's further engagement with the work (including, but not exclusively measured by, time on task). At the same time, adults need assistance in how to engage younger children. In addition, knowledge of young children, and what keeps them "busy" is not enough to maximise the benefits of their museum experience. Knowledge of how young children learn, the importance of active engagement in the learning, and the importance of building from what the children already know, are all key features in assisting adults who accompany young children in the museum.

Whilst interactive components are attractive to children, they do not ensure learning takes place. Criteria for determining the educative functions of exhibits need to be addressed at the design level. In addition, it is important to note that children can lead

other children to look again/talk/play, and providing structures and opportunities for this to occur would enhance the children's visit.

The researchers found data collection more difficult in the museum than in the other project sites. This was due to the fact that we were not observing large groups, but rather more intimate and isolated groups, making it difficult to remain inconspicuous. In "Endangered Species", it was difficult to position ourselves without restricting visitors' viewing. Photography was difficult because of the lighting. A team of researchers, rather than one or two, could have collected more data in the same amount of time, probably depicting a richer picture than we were able to capture. The Visitor Behaviour Schedule (Rennie and McClafferty, 1996) was useful in this setting, and provides a good picture of how exhibits were used.

Collaboration between QM and QUT

Collaboration between researchers and museum staff was not so easy in this setting. It was always difficult to meet with everyone - most meetings were with one or two of the education staff, but rarely if ever with all of those involved in this area. "Buzz Week" staff were not included in any of the project meetings. It became difficult to share the knowledge we were collecting through the data, since some members of the team not aware of the purpose and construction of the project. This was partly because of their inability to attend initial meetings, or meetings held at later stages of the project. As time progressed, this made it difficult to establish common goals. For instance, some of the museum staff seemed confused that we were not observing the school group visits, but this was not part of the original research plan. However, the opportunity to meet with some of the design team for "Endangered Species" was beneficial to the collaborative research, and helped in the research plan for that specific exhibit.

Time constraints on staff meant they were not available to participate in data collecting sessions with researchers from QUT, and a team of researchers could have collected more useful, detailed data. The recognition of the importance of ascertaining visitor needs through ongoing research, preferably conducted by the museum staff, calls for appropriate time allocation and staffing to make this possible.

Recommendations

We make the following recommendations for QM to consider in relation to policy and practice for young visitors.

1. Gather more accurate information on young children, their behaviour, needs, and how to best assist their learning.
2. Review the budget with respect to young children's participation in museum visits.
3. Review policies with respect of young visitors, especially in the areas of supervision, access, education, design and public programs.
4. Review the guide system for its appropriateness for young audiences.
5. Give consideration to the development of a cohort of volunteers to work with young children and families.
6. Establish an ongoing professional development program for QM staff (protective services, education, designers, curators, and policy makers) to learn more about the needs of young children in museums, and allocate regular time for conducting ongoing visitor research as part of their work.
7. Gather information on the learning outcomes of children when they visit the museum.
8. Develop partnerships with schools, universities, families and local communities to determine the needs of all parties in making the treasures of the museum more accessible to young visitors.
9. Develop a front-end planning system that ensures expertise is used when planning exhibits with child-centred activities.

Bibliography

Rennie, L. and T. McClafferty (1996) *Handbook for formative evaluation of interactive exhibits.* Perth: Curtin University.

CHAPTER *6*

QUEENSLAND SCIENCENTRE

CASE STUDY

6. QUEENSLAND SCIENCENTRE - Case Study

Background

The Queensland Sciencentre opened its doors to the public in 1989. In the past decade, it has become a visible part of the museum world with more than one million visitors through its doors. Initially situated in a building in William Street, the Sciencentre outgrew its original home and moved to a newly restored historic building in George Street in 1993.

The Sciencentre occupies the entire premises with three floors of exhibition space for a wide variety of science and technology exhibits. A high proportion of the Sciencentre visitors are school children who come to visit as part of a school excursion program. The centre is staffed with a small number of paid professionals and a large cohort of volunteer "explainers". The centre has been the subject of various research projects. Information about its exhibits and programs has been presented at various conferences in Australia and New Zealand.

"ScienceSpot" is a special hands-on science exhibition for children under eight years of age. Under guidance of the Sciencentre staff, the exhibit was designed and built at the Queensland Museum with professional input from a reference group comprised of early childhood teachers and university staff from QUT. "ScienceSpot" opened in 1997 and had been visited by 13, 983 people until the end of 1998 (9,562 preschool children + 4,421 adults). It is a user pays exhibit located on the top floor of the building.

A manual on "ScienceSpot" was written by the Deputy Director of the Sciencentre and may be purchased from the shop or by mail order. The book contains detailed descriptions of the aims of "ScienceSpot" and provides information about the scientific concepts which inform each of the exhibits. In addition, the Sciencentre

commissioned a well known children's book author to write a story based on a relevant theme. The book, "Velvet the Flying Gecko", was written by Jill Morris and illustrated by Bronwyn Searle; a "big book" format was produced to be used for formal storytelling sessions to the large groups who come to visit the exhibit. **A** song was written to highlight the adventures of the gecko and its tune is incorporated in the exhibits. Large puppets were made by a well known Brisbane puppet maker (Linda Woods) and are used in the set program provided to booked school groups during their 90 minute session.

The current study

In collaboration with the Director and Deputy Director of the Sciencentre, we developed our research plan to examine the learning behaviours of young children visiting "ScienceSpot" either in a booked school group or in **a** family group. During the period of our study, we observed about 350 young children and their carers, We also observed various people taking the leading role in guiding children's learning through a formal program, including two pre-service teacher education students on practicum and one teacher-presenter appointed as the early childhood staff member for the Sciencentre.

Data collected in the early part of the year was shared with Sciencentre staff, and further planning occurred as a result of these discussions. At mid-year, the Sciencentre employed a former primary school teacher to be attached to "ScienceSpot", and to make further developments in programming. We collected second set of data after these changes and this was discussed with staff.

Exhibition Observational Method

Researchers focused on three main strategies for gathering information in this exhibit: following a group as they visited "ScienceSpot", following one child's experience of the exhibit, and rating various exhibits using Rennie and McClafferty's (1996) Visitor Behaviour Schedule. Multiple techniques were employed for data gathering: anecdotal records, time samples, running records, checklists, photographs and visitor behaviour schedule. In addition, we examined the practicum notebooks of the two pre-service teacher education students for their appraisal of the children's responses to various aspects of the exhibits **and** program. **All** data was coded and analysed by the QUT research team.

Focus of Research

We were interested in documenting the characteristics of young children as learners in an interactive science exhibit. Our observations focused on young children's interactions in three contexts: with objects and exhibits, with adults, and with other children. We were particularly interested to see how well children understood the scientific concepts of the exhibit. In addition, we examined the policy and statistical records of the Sciencentre with respect of young children as a learning audience.

Description of the case

Policy and Funding

The Sciencentre has an overt policy of inclusiveness with respect of young children. Since 1995, when planning for the special early childhood exhibit commenced, the senior management and the Sciencentre Management Committee have expressed

interest in providing a place for young children within the building and the overall program. A variety of services are available on a users pays basis, including a guided program within "ScienceSpot", a teacher/parent handbook, professional development activities for teachers and family science programs.

Children's Visits to "ScienceSpot"

During the study period, we observed children in two different phases of the development of the "ScienceSpot" program. Our initial period of observation coincided with the program being managed by two pre-service teacher education students from a local university. In the latter part of the year, we observed again when the newly appointed early childhood educator had made revisions to the children's guided program in "ScienceSpot".

Without a doubt, children are excited about the physical environment and exhibits in "ScienceSpot". As they enter the gate into the exhibit, children point to exhibits, dash forward to examine objects and gaze intently at the colourful and innovatively designed area. During our study, young groups visitors were not able to act on their initial impulse as the program dictated that children had a formal meeting to start their visit. The presenter seated the children on the floor, while parents/carers often took seats on the benches on the perimeter of the meeting place. Children were provided an introduction to the exhibit and its areas, read a story and divided into groups. This period occupied up to 30 minutes, by which time children were very eager to play.

With groups as large as 60 coming to each 90 minute session, it was not possible for all children to go to the active area of the exhibit as first choice. During the time of our study, this necessitated a splitting of children into groups with half in the "action spot" area and the other half in the "showtime spot" and "video spot" areas. Although there are a number of exhibits in each area, children were captivated by the movement

and energy of the "action spot" area. Those assigned to the "showtime spot" or "video" group often sat on the perimeter watching the action instead of participating in the exhibits in their zone. **A** limited number of children could use the "video spot" area and they required an attentive adult to help them make sense of the chromakey exhibit.

Children were very engaged in "ScienceSpot" as they moved balls, loaded the rocket and manipulated the exhibits. They frequently worked in partnership with other children to play with certain exhibits (rocket launch, pedalvator, ball run, chromakey) yet sometimes worked alone to complete a job away from the bustle of the rest of the exhibit (ball pyramid, sound boxes). At times, but not frequently, children in groups interacted with parents/carers/teachers in doing various tasks **and** took direction from adults when they were uncertain how to do some tasks.

Children were busy and seemingly happy in the exhibit, but we wondered if they were actually learning anything about science. To focus on this question, we used close observation and noted that there were many lost opportunities for promoting children's learning in this exhibit. Our conclusions come from our analysis of individual children's use of time and exhibits. For most young group visitors to "ScienceSpot'', the 90 minute booking offers only 30-45 minutes of exploratory play. Upon arrival at the Sciencentre, children move from the ground floor to the exhibit on the top floor of the building. Using stairs to make the journey, groups of **up** to 60 children take considerable time to navigate the premises. Once settled in the "ScienceSpot" exhibit, children attend a group meeting where the operating rules for the day are discussed, the scene is set for their play and other organisational matters (grouping, supervision and so on) are discussed. During this time, the presenter usually tells a story or demonstrates an exhibit. In our observations, little attempt was made by the presenter to get to know what they children already understood about the

exhibit and relevant scientific concepts, as this is designated as a time for talking about "ScienceSpot".

Sciencentre staff make good use of the Velvet character and resources (big book, puppets and song). We noted that children were already very familiar with the character and the story. On one occasion, as the presenter began to read the story, a parent was heard making an aside remark of "Oh no, we have already read that story every day for the past fortnight". Despite the reliance on the Velvet story and character, little is done in a formal sense to capitalise on the scientific concepts in the story or to identify where the characters are located in the "ScienceSpot" exhibits. Thus, a link between the story and the exhibit is left unconnected.

From arrival to the end of the formal meeting, nearly one third of their booked visit has transpired and few learning opportunities have been utilised fully. Another segment of formal group meeting was held at the end of the children's visit; this segment took about 20 minutes and included some "clean up" duties followed by a presenter demonstrating a science experiment or leading a musical session (singing the Velvet song accompanied by instruments). There was rarely an opportunity to discuss the children's discoveries or to make links with their scientific discoveries during this session, as the staff was mindful of the need to finish on time; often another group was waiting for entry. Thus, on an overall time basis, children spent more than 50% (roughly 50 minutes) of their booked visit in formal meetings or in transit throughout the building.

During the interactive segment of the visit (roughly 40 - 45 minutes), when children began to explore the exhibit, parents/teachers/carers played one of two roles: they either sat on the benches throughout the exhibit and chatted among themselves (as they might in a playground) or they became guides for the children's activities. Adults seemed ambivalent about their roles and little attempt was made by the busy

staff to utilise adult visitors as guides or supporters for children's learning. As a result, we noted a lack of interaction between adults (including teachers) and children during "play" session, thus causing us to wonder what might be done to foster more collaborative arrangements for children's learning.

The designers of the exhibit went to great effort to develop easy-to-use exhibits with simple labels for explanation of the scientific concepts explored in successful operation of the activities. In our experience, we noted that children did not have a guide to explain the concept to them, or to help them arrive at the scientific concept through a process of guided discovery. By and large, children rushed around in the area, manipulating the exhibits and enjoying the opportunity to touch and act upon various hand-on interactives. For example, many children worked on different strategies to load balls into the rocket exhibit, but failed to understand that their actions contributed to the launching of the rocket. Time and again, we noted that adults ignored the labels and went (like the children) into the exhibit without having any idea of how best to use and learn from the activity. At times, several exhibits were broken or not functioning properly due to missing pieces, as in the pedalvator, bucket hoist, dress ups and spotlight areas. Sometimes, we observed children learning in spite of the broken exhibits, as in one child's insistent use of the pedalvator; she lodged balls one by one into the ramp and carefully guided them up the ramp by accommodating the broken conveyor belt mechanism.

With a limited time frame for play, arid even more strictly limited access to the coveted ball area, children attempted to use as many exhibits as possible. This sampling of activities led to wide exposure of the exhibits, but failed to provide any options for conceptual gains in scientific understanding. It would appear that children need repeated visits in small groups to make the most of the inherent learning potential of the "ScienceSpot" exhibit.

We observed some instances of adult-child interaction working successfully and found that this collaboration between learners sustained and deepened children's time on task and successful use of the exhibit. For example, when adults figured out how to use the chromakey exhibit, they would gather together some children and show them how the exhibit worked. Children stayed with the activity to its conclusion if an adult provided a supportive presence.

Main Lessons from Sciencentre Observations

Visitor learning

Our key objective was to gather focussed observation on children's behaviours that might show us the ways in which children learn when using interactive exhibits. We noted the following indicators of children's learning in the "ScienceSpot" exhibit:

playing with interactives
exclaiming (aha! experiences - "I can do it")
talking with other children (explaining, organising)
talking with adults (cooperative learning)
pointing (identifying)
looking (observation)
asking questions, permission
answering questions
solving problems
trying out ideas
revisiting exhibits
comparing results
noticing results of actions
inviting another to interact
using pamphlet
watching others (onlooker behaviour)
recalling story line and characters
using vocabulary (process oriented, not content)

Our observations revealed that activity was taking place in the "ScienceSpot" exhibit, but we found it was very difficult to measure learning in very young children. Thus we concluded that process-based and affective learning does take place in the exhibit, but we are uncertain of the depth and durability of the learning. We believe that much

of the learning is process based and affective knowledge. Given the very brief time frame for children's play in this exhibit and the lack of informed adult interaction with children, we saw no evidence that sustainable scientific concepts have been acquired. It is difficult for us to gauge children's learning in this area due to the limits imposed by interviewing children of this age group by strangers. Hence, we would propose an alternative strategy (parent and teacher interviews of their children) for checking children's cognitive gains in any follow up study.

In terms of the exhibits, it is very evident that there are certain favoured aspects of "ScienceSpot": the "action spot" area with its busy ball play on ramps, hoists, with barrows and pulleys was favoured by the majority of children. This is **a** highly attractive area of the exhibit and it is used fully. Even so, we noted many lost opportunities as there was no chance for children to talk about science as they played, or to reflect on their learning immediately afterwards. In terms of attractiveness, the "video spot" exhibit held children's attention fairly well especially when it was supported by an adult who discussed what was happening with the children. Within the "showtime spot", the mirrors and curtained rooms held the least interest for children. Some children were very frightened of the dark curtained area and refused to enter the space even though they were cajoled by peers and adults to have a look.

From the child's viewpoint, it is obvious to the research team that three key factors could enhance the quality of their visit. First of all, children of this age group seem to learn best in small groups with knowledgeable adults to prompt and extend learning. It would appear that the Sciencentre staff needs to review policy and practice with regard to group visits in order to capitalise on the presence of the adults who accompany the children. This may lead to better learning outcomes for all concerned.

The second factor that affects the quality of the visit is the time to spend in self-directed play or in collaborative play with peers. Children appear eager to use the

exhibit and it would appear from our observations that the use of the formal meetings inhibits the children's options by reducing time spent in interaction with the exhibits. Many valuable opportunities for teaching are evident in the children's activity time, and perhaps the staff could reconsider their role to play a more involved part in fostering learning in the children's play.

The third factor that may affect children's learning is the effectiveness of the exhibits. Each of the exhibits is designed to promote a scientific concept but very few are used to their fullest potential. One limitation is the frequent breakdown of the exhibits (broken pedalvator, failed batteries). Another is the incomplete nature of the exhibits (lack of dress ups for chromakey, lack of bucket and hoist).

Collaboration of Sciencentre and QUT

Our work at the Sciencentre was conducted in a collaborative manner with participation of staff and volunteers in all aspects of the research including goal setting, data collection, analysis and discussion. We had frequent communication by telephone and in person as a group of co-researchers. Staff from the Sciencentre participated in the mid-year professional development program at QUT with Professor Paris. **A** limited amount of data was collected by the Sciencentre staff during the project.

Recommendations

We make the following recommendations for the Sciencentre to consider in relation to policy and practice for young children.

1. Gather information on children's learning in "ScienceSpot" as a routine **part** of daily work in the exhibit.

2. Modify the program to provide a longer time in the exhibit and more time for children's discovery based learning.

3. Give consideration to the development of a new cohort of volunteers to work with young children and families.

4. Develop partnerships with schools, families and local communities to determine the needs of all parties in making the benefits of the Sciencentre accessible to young children.

5. Make improvements to all existing exhibits and build better links between the available resources of the "ScienceSpot" exhibit and Velvet the Flying Gecko picture book.

6. Establish an on-going professional development program for all staff and volunteers to learn more about the characteristics of young children in science centres.

7. Continue collaboration with university researchers to build solid learning programs for young audiences.

Bibliography

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CHAPTER 7

GLOBAL ARTS LINK

CASE STUDY

7. GLOBAL ARTS LINK - Case Study

Background

Global Arts Link (GAL) is a new initiative of the Ipswich City Council. Designed to stimulate growth in the artistic and cultural lives of people in the city, GAL will open its doors in 1999. From the outset, the planners of this new cultural centre incorporated young children and families as part of the target audience. A portion of the floor space was designated as an "early childhood" gallery in the architectural brief. The project planners sought expert advice of early childhood educators and academics during the planning stages.

GAL prides itself on its community based planning process and philosophy. In setting its aims, GAL has reached for a community development model where local people have expressed their views of what might constitute the new cultural centre. Thus, various interest groups in Ipswich have come to "morning teas" to discuss aspects of the community's cultural heritage. The GAL staff have combined knowledge of museum practice to the wishes of local residents to draw up a blueprint for a new cultural centre.

The inclusion of young children in this cultural centre has provided a challenge to the GAL staff and the local early childhood experts. The QUT research team joined in the process early in 1998. The following case study provides information about the front end planning process and many of the key issues addressed in developing an early childhood exhibit space in a new museum. The findings may be of use to others who are planning new spaces in existing museums or to planners of new museum/gallery environments.

The Current Study

As GAL is not yet operating as a museum space, it is not possible to describe the responses of children in the same way as the other case studies, Hence, this study focuses on the front end planning process and, as such, provides details of the central questions and challenges faced by museum planners when designing spaces for young visitors.

Time Frame for GAL Planning

GAL joined the research project in March 1998, following a meeting between the chief investigator and senior GAL staff. This report accounts for the information exchanges that occurred in 1998. In addition, GAL organised two formal professional development activities (one by invitation and one for the general public) to involve early childhood educators in making a contribution to the proposed children's gallery and program. The report contains information about these formal meetings and their outcomes. Our consulting role with GAL remains in place in 1999, but on an informal basis.

Focus of the Research: The Front End Planning Process

According to its publicity brochures, Global Arts Links is a new model for a visual arts museum. From the embryonic stages, the planners aimed to ensure that there was a strong emphasis on community based audience development. Thus, GAL set up reference groups, task forces and public meetings to promote community consultation and participation in the new museum.

GAL will be housed in a newly renovated public building in central Ipswich. The new museum will occupy a prominent spot on the main street of the city in the Old

Town Hall, a building with a strong history. Exhibits in GAL will focus on the visual arts but will emphasise the place of the visual arts in a large cultural context. The new museum is best described as a hybrid museum with an emphasis on culture, heritage, visual arts and community development.

Overall, the museum plans to provide space for a variety of exhibits including the "Old Town Hall Interactive" (a space for exploring the ways in which the building has been used in its past), an indigenous component, a major exhibitions gallery capable of hosting **AAA** rated works, a "Meet the **Art** Makers" exhibition and an early childhood gallery. From the outset, the GAL senior staff have stressed that they want children to visit all areas of the museum and expressed interest in accommodating children in all exhibit spaces. However, the senior staff also realised their role in shaping a new audience for the arts and tackled this problem by dedicating a large space for young visitors.

Recognising the limits of their own knowledge of this audience group, the GAL senior management team joined in the QUT-Industry research project to become involved with the larger cohort of museum staff investigating the ways in which children learn in museums. Together, the research team from QUT and senior staff at GAL devised a planning strategy with two components: professional development activities and on-going consultation.

The professional development component incorporated two main activities. In the first instance, a reference group of early childhood educators (academic experts and local preschool teachers) met with **key** GAL staff in the early part of the year to participate in a one day meeting about children's learning in museum settings. The chief investigator led the session and provided information about worldwide research and innovation in this field. Members of the reference group worked collaboratively with key *GAL* staff in small groups to address some of the key questions about what

kinds of facilities (especially interactive learning options) would best suit young learners and what kinds of exhibitions would be attractive to young children.

The second professional development activity occurred later in the year after the GAL team had conceptualised and planned their new gallery space. At this meeting, GAL and QUT presented information about the early childhood gallery, "Lottie's Place". A broad representation of early childhood teachers attended the meeting to gain information about the exhibit and the new museum.

The GAL team also participated in on-going professional development/consulting activities throughout the year. One of the GAL team attended numerous meetings at QUT to gather information from the project staff, including participation in the one-day research training meeting conducted by Professor Pans. In addition, GAL staff called numerous meetings with the chief investigator and the senior research assistant to test ideas about the organisation of the gallery space and the design of the interactive elements.

Various issues were addressed in the formal and informal aspects of our consultation. First and foremost, the characteristics of young children as learners (both in and out of the museums) became a central point for consideration. Secondly, the design of the exhibition space occupied many hours of our consultative process. While we are aware of plans for permanent interactive, early childhood visual arts exhibitions in the USA (e.g., Eric Carle Picture Book Museum and Indianapolis Children's Museum), we were not able to locate any information about other permanent spaces. Thus, the team found themselves in unexplored territory and used various methods for securing valid infomation about how best to proceed. In the end, the team simply got on with the planning process and utilised information from other interactive learning exhibits in the areas of science, technology and history. Where we were aware of other temporary visual arts exhibits with an early childhood interactive focus, we analysed

the design elements for potential use in the new space. We also used our own experiences from work at the Queensland Art Gallery and at an exhibition of children's picture book illustrations at the Queensland Perfomring Arts Centre ***(The Art*** of *Eric Carle).*

In the midst of acquiring information about exhibits, we developed a very extensive network of museum educators and other allied experts via the Internet and local contacts. This field (early childhood museum design) is a very new area and information about project findings is not widely distributed via journals or other traditional reporting mechanisms. Thus, we found our contacts in this area to be a valued source of information. GAL keeps a running brief on the Museum Education List Serve on the Internet and has proposed problems to that group from time to time. The advice has been useful, but not universally adopted.

We found that there were some central points of argument about children that came up repeatedly in our face-to-face discussions and in the Internet discussion groups. One set of questions had to do with views of children. From OUT analysis, three main perspectives about children are held in the museum community. Some view children as competent learners, others as consumers of information and still others as commodities for financial gain. These perspectives on children colour the ways people plan services for young children and it is interesting to note the transparency of attitudes in the field at large.

Clearly, GAL is working to ensure that their visitors are seen as competent beings who consume information about art. GAL does not plan to charge admission for its exhibitions, but may charge for value added activities such as workshops and special exhibitions. The matter of making the program financially viable is not an issue at present for this museum, as the city council. has provided strong financial investment in the promotion of the cultural centre.

Exhibition plans

When "Lottie's Place" opens in May 1999, there will be eight new areas for children to explore art within the one gallery area. According to notes prepared for teachers, these are the planned areas:

Special Exhibition: "Lottie's Friends: An exhibition about animals, acrobats and friendship"

This exhibition features the work of two different visual arts forms. In the first, lithographs have been selected to explore the notion of friendship and a sense of place through the use of familiar images and motifs. Children will also examine porcelain plates which include images of animal mothers and their young.

Regular on-going exhibitions:

- Your Space – permanent display area for young children's art work
- Amphitheater and Reading Area – meeting place, performance and reading area
- Magnet Wall – a place for building pictures from images
- Drawing Area – a place to draw
- Computerised Paint Screen – a place to draw with fingers on a touch screen
- Dress up Cloaks – multi-sensory play clothes
- Floor Show – an small exhibition beneath your feet

The staffing of "Lottie's Place" has not been finally determined. For preparation of the opening exhibition, two art educators have been appointed to prepare curate the exhibition and prepare teacher/family notes. GAL is still in the process of finalising its long term strategy for management of the early childhood space. Under consideration are matters relating to the development of a volunteer *corps* to guide

visitors through the exhibits and a process for building strong schools/community liaison networks.

Collaboration between GAL and QUT

Our work at GAL was conducted in a collaborative manner with participation of staff in our training sessions and in the project team collaborators meetings. One of the GAL staff participated in the one day workshop with Professor Scott Paris. Given the nature of the planning for GAL, the QUT team's work was largely consultative. We anticipate another set of issues will emerge once the gallery is operational.

Recommendations

We make the following recommendations for the Global Arts Link staff to consider in relation to policy and practice for young children:

1. Establish a research agenda for the new gallery space.
2. Develop written policies about how to work with families and children.
3. Develop a volunteer corps of people who are interested in guiding young children's learning in "Lottie's Place".
4. Gather information about children's learning as a routine part of daily work in the gallery.
5. Build strong partnerships with schools (preschools, child care centres, kindergartens, primary schools and after school programs), families and the local community to continue to make the benefits of the exhibits accessible to young children.
6. Establish an on-going professional development program for all staff and volunteers to learn more about the characteristics of young children as learners.
7. Continue collaboration with university researchers to build solid learning programs for young children.

CHAPTER 8

FINDINGS

8. FINDINGS

During our project, we noted that there were many common issues facing museums in relation to young children's learning. This section of the report provides a summary of key points for consideration by all the study sites, and indeed, for all museums. The findings are organised in three areas: children, communities and museums.

Children

There is no doubt in our minds that there is a great deal of interest in museum going among families and children. Over the duration of our research we observed a steady stream of children in museums. **As** noted in the case studies, there was **a** great deal of difficulty in making any detailed analysis of how deeply children learned, but we are able to make some informed and reliable observations about their activity and characteristics as learners.

- Children were very attracted to hands-on exhibits. We noted that such areas sustained children's interest and assisted them in recalling aspects of their visit to the museum. While children enjoyed the mechanical aspects of hands-on activity, they also enjoyed the opportunity to observe adults (artists, scientists) at work or to view interactive media such as videos.
- Children's visits to museums were notably more purposeful when they had a chance to interact with people while in the exhibit. The interactions -- either with adults (parents, grandparents, teachers, guides) or with peers -- led to children holding conversations about the content of the exhibit. The success of these

interactions depended on the size of the group, with smaller groups leading to more fruitful results.

- Children are newcomers to the world of museums and require some way of understanding these institutions. Few children had a satisfactory introduction to the museum during our observations.
- As learners, children connect more readily to exhibits if their personal, cultural and age characteristics are taken into account by the adults who accompany them. Children's interests seemed to be best met within a family grouping where parents, grandparents and siblings related information from the exhibit to the child's known world.
- Children in the early childhood age group are naturally inquisitive and active. They are multi-sensory learners who investigate their world with great vigour. When using interactive elements, children require durable exhibits that can withstand robust activity. In addition, children learn through reflecting on their activity and require an adult or peer with whom they may discuss their new-found ideas.
- Children were reluctant to speak with researchers about aspects of their visit, This is to be expected, and thus we feel it is crucial to develop strong links with parents and schools to enlist support for their interviews of children.

Communities

Within the scope of the community, there are two main institutions who care for children: the family and the school. Broadly conceived, the school community in this report consists of child care centres, preschools, kindergartens and schools. Families and schools are the primary groups who utilise the museum as a place for excursions

with young children. In fact, as we have discovered from this study, about 95% of groups who use the Queensland Museum are families.

Informal survey results from the Queensland Art Gallery indicate that families want (and need) more support for guiding children's learning in a museum. This view is also widely held by teachers in schools. Those families and schools who bring children to the museum clearly understand there is some distinct advantage to be reaped from participation in these venues, but many express a poor understanding of discipline knowledge (art, science, history, technology). We noted a degree of interest from adults in learning more about the museum and its collections via various lectures, seminars and projects.

We also noted that the expertise of parents, teachers and other adult volunteers relating to young children was not fully utilised in the museum. Teachers, for instance, had the ability to manage groups with ease and speed, due to their training and familiarity with the group. As well, parents knew of their children's ideas, interests and strengths. This knowledge was ignored once children entered the museum and its programs, thus presenting a lost opportunity.

Based on our observations, we found that there is a pressing need to build a bridge between the community and the museum – a bridge that will link children, their families and schools to the museums in a collaborative process of learning. The Queensland Museum has proposed that a joint venture training program should be established which might involve schools and families in a close liaison with the museum to build such bridges, Such an initiative could be strengthened if all the

museums worked together to build an informed community of visitors, starting to build an audience of lifelong museum visitors.

Museums

As observers of young children in museums, we took a special frame of reference throughout this research. We found ourselves in an unusual position and took advantage of our unique opportunity to carefully examine how an important cultural institution served the youngest members of society. We were met by all institutions with a great deal of respect and with an openness to explore fully the venue, its staff, their practices and policies. In our explorations, we found that museums were willing, even eager, to build children into their programs. But, we also found that the institutions need to change in some ways to make their espoused interest in children a viable reality. The findings listed below are based on our observations, but we might add that the literature indicates that such issues are faced by museums all over the world as the culture of the museum make a transformative shift to a learning based approach to its local and global communities.

- Museum policies are ambiguous and confusing with respect of visitors; where we were able to examine strategic plans, we noted a lack of planned commitment to visitor research. Research commitments in museums seem to focus on collections, not visitors.
- The presence of visitors in museums is assigned variously to departments in any one venue. Thus, visitors may be the subject of up to three different sections (publicity, education, public programs) without a cross reference between departments to ensure coherence for staff in delivering services to visitors.

- In relation to the design of exhibits for young children, it would appear that there may be excellent results if a collaborative team (curators, education officers, academics, designers, policy makers, publicity) works on selection, design, implementation and evaluation of an exhibit. However, various constraints (time, inter-department conflict, budget) could potentially inhibit the on-going process from achieving its highest benefits.
- Design teams require knowledge of the audience in order to achieve the best outcomes for learning in the exhibitions. In relation to young children, design teams require understanding of the characteristics of children, their personal interests and cultural backgrounds. Such information may be acquired through consultation with families, schools, universities and museum educators.
- Museums are in a very good position to acquire information about young visitors by establishing a research culture within its own staff. All staff could become involved in building up a stronger awareness of the visitors to the museum, and thus could make a valid contribution to the evolution of museum exhibitions and programs.
- Museums offer learners the opportunity to make contact with ideas, objects and events that are not available in the home or school. This privileged position puts museums at the forefront as a potential innovator in community based, informal education.
- Stronger links could be forged with schools and families through a joint venture program to connect the museum and its riches to the local community. Such an initiative could be best developed as a multi-museum collaboration with involvement from user groups, community experts and a cross section of museum staff,

- Interactive exhibits for young children must be built to withstand manipulation by young learners; thus, durability, quality and safety are primary consideration for designers and builders.
- Museum staff expressed a strong interest in on-going staff development opportunities, particularly related to researching visitor learning. There seems to be potential for making a significant contribution to the worldwide understanding of this audience through the work undertaken in this study.

CHAPTER 9

RECOMMENDATIONS

9. RECOMMENDATIONS

Aside from the particular recommendations for each of the museums, as presented in each case study, we propose the following recommendations for continued collaboration between QUT and the industry partners.

Partnerships

First, and foremost, we believe it is highly desirable for all concerned to maintain our partnership as co-investigators of children's learning in museums. This research team appears to be the only multi-museum/university team in the world investigating young children's learning. There has been a very strong degree of interest in our work and we believe it will continue to attract attention from various sectors of the museum and education communities. From our baseline study in 1998, we have established a clearer understanding of the ways in which children experience museums. Our work is the first Australian study of its kind and, for that reason, it adds a significant new slant on museum learning research.

A further partnership needs to be developed between museums and the local community – this time with families and schools (including child care centres, kindergartens, preschools and primary schools). If our work is to succeed in the future, we believe it must be tied to the needs, interests and desires of the community. Local teachers and families could become an important source of information about the ideas and learning powers of the children who they accompany to local museums.

As partners with local communities, the collaborative research team could build sustainable programs and lifelong visiting habits for this museum audience.

Informal Learning Research

On a global level, there is widespread interest in "informal learning", that is, learning which occurs outside of formal school environments. Museums are one important site for informal learning, and we believe our work can help to shape a new way of examining the way Australians make use of such venues. Much of the informal learning research has been undertaken in the USA and UK, but there needs to be studies of Australian activities and learning styles as we did not always find the overseas examples fitted the Australian situation.

We believe there are numerous papers to be published from our data and we look forward to making a contribution to the knowledge base from our cultural vantage point and our age cohort.

Training

To continue our work in this area, it is imperative that we extend our research team. We note the limited number of skilled researchers in this area and would recommend that each museum identify relevant, interested and suitable candidates to continue to conduct research.

APPENDICES

Appendix A

Beyond Look & Learn - Schedule of Meetings

1998

Date	Place	Meeting
5 February	QUT	Collaborative team
9 February	Sciencentre	Sciencespot team
16 February	QAG	QAG team
24 February	QUT	GAL team
25 February	QM	QM team
5 March	QUT	Collaborative team
9 March	QUT	GAL planning meeting
14 March	*GAL*	Workshop
20 March	*GAL*	Discussion
15 April	Sciencentre	Sciencespot team
18 May	QAG	Front-end Planning
19 May	QAG	Gallery design staff
3 June	*GAL*	Reference Group
4 June	Sciencentre	Sciencespot staff
11 June	QUT	Collaborative team
19 June	QM	Education staff
29 June	*GAL*	Reference Group
16 July	QAG	"Portraits" preview
20 July	QM	Education staff
28 July	*GAL*	Reference Group
3 August	QUT	Industry Partners
11 August	QM	"BuzzWeek" staff
17 August	*GAL*	Reference Group

20 August	QM	“Endangered” design team
25 August	Sciencentre	DH;FM…review
11 September	QAG	MB;FM…review
12 November	GAL	Seminar
12 November	QUT	Collaborative team
17 December	QUT	*GAL*, Louise Denoon

Appendix B

Beyond Look &Learn - Schedule of Data Collection

1998

Date	Time	Venue	Researcher
23 March	10am	QAG - "Emily"	FM; BP; LMc
30 March	10am	QAG - "Emily"	FM;BP;MB;QUT stu's
21Ap-8May	various	Sciencespot	FM
27 April	11am	Sciencespot	FM; BP
6 May	11am	Sciencespot	FM; BP
29 June	11am	QM - Holidays	FM
5 August	9am	QM - "BuzzWeek"	FM
13 August	9am	QM - "Buzz weeek"	FM
16 September	10am	QAG - "Portraits"	FM; MB
29 September	12noon	QAG - "Portraits"	FM
2 October	10am	QAG - "Portraits"	FM
2 October	12noon	QM - "Endangered Species"	FM
3 December	9.30am	Sciencespot	FM;BP;KW
10 December	9.30am	QM - "Endangered Species"	KW
15 December	9.30am	Sciencespot	FM;BP;KW;DH;MA
16 December	10am	QAG - "Scary Monsters"	FM;BP; KW
16 December	12noon	QM - "Endangered Species''	FM;BP;KW
13 January	1pm	QAG - holiday workshop	FM
20 January	10am	QM - "Digging up the Past"	KW

ANNOTATED BIBLIOGRAPHY

Annotated Bibliography

Collected from the Museum Learning Collaborative Website in January 1999
http://mlc.lrdc.pitt.edu/mlc/

Abbreviated annotations prepared by Katrina Weier and Felicity McArdle

Alexander, M. & Weinland, T.P. (1985). Museums and Schools - "The Learning Imperative". *Social Education*, 49 (7), 563, 566-567.

The writers salute 1984 report of the Commission on Museums for a New Century. This awards primacy of education as a goal of American Museums. It recommended holding a national colloquium to examine school-museum partnerships. The primary sources, objects and exhibits of history museums afford students the experience of applying critical thinking skills to the "stuff" of history.

Ambach, G.M. (1986). Museums as places of learning. *Museum News*, 65 (2), 35-41.

This is also in response to Museums for a New Century Report (1984). The article discusses publicly-funded museum-school partnerships. Museums are well positioned to provide links to our common cultural heritage for present-day school students, including the ethnically diverse and poor. This calls for a commitment to education on the part of all museum staff. The article discusses the need for a variety of interpretive approaches, inter-disciplinary learning activities, and in-service training for teachers. The writer suggests funding to train parents to support their child's learning, laying the groundwork for lifelong learning. Teachers and parents alike need to learn how to mediate the learning of children in museums. Each type of museum and even each individual museum represents a unique learning environment.

American Association of Museums. (1984). *Museums for a New Century: A report of the Commission of Museums for a New Century*. Washington, DC.

The report finds that all components of a museum, not just education departments, should be committed to fostering learning. It calls for a research program backed by a philosophical framework that would illuminate the nature of such learning. It explores the debate about formal versus informal learning, and the historic tension between the dual museum goals of preservation of objects and public access. This is an important part of the historical background in this field.

American Association of Museums. (1992). *Excellence and Equity: Education and the Public Dimensions of Museums*. Washington, DC.

The authors include a brief discussion of informal learning in museums, and call for further research on the nature and potential of this learning. This is considered a landmark statement by the American Museum community about its educational mission.

Anderson, D. & Lucas, K.B. (1997). The effectiveness of orienting students to the physical features of a science museum prior to visitation. *Research in Science Education,* **27** (4), 485-495.

This is a report a study on the effect of pre-orientation on high school students' learning. The data was collected from a visit to the Qld Sciencentre. The writers found that students who had previously visited the Sciencentre and had received background information about the Qld Sciencentre performed significantly better on the post-test than any other group.

Association of Science-Technology Centers. (1993). *What Research Says About Learning in Science Museums, Volume Two.* Washington, DC.

The **book** includes chapters on methodology, educational technology, gender research, the design of field trips, and using cognitive research in museums. "What Do We Know About School Field Trips?" by Stephen Bitgood - this is a useful example of how to discuss research in learning in museums with museum practitioners.

Association of Science-Technology Centers. (1990). *What Research **Says** About Learning in Science Museums.* Washington, DC.

Book chapters include: "Methods of measuring learning" by Jeffrey K. Smith, "Applying learning theory in the development of a museum learning environment" by Linda A. Black.

Beverly Serrell (ed) in introduction, describes **4** themes: (1) There is not as much useful research done in museums as you might think. There are far more assumptions and theories than data. (2) Applying research done in classrooms to museums is difficult. (3) It is important to have your own philosophy about education and learning so that you know why you do or do not agree with an argument or **an** exhibit philosophy. **(4)** Museum research tends to be more pragmatic than theoretical. Writers encourage museum professionals to form a clear understanding of what they believe to be true about how people learn.

Barnard, W. & Loomis, R. (1994). The museum exhibit as a visual learning museum, *Visitor Behaviour,* 9(2), 14-17.

This study has several findings of interest. Using recognition tasks as a mechanism for tapping memory is superior to the use of recall tasks. There is an inverse relationship between the number of objects seen and the number recognised. There is a direct relationship between time spent observing and objects recognised. There is a limited effect of labelling on recognition such that shorter labels result in greater recognition. The research is consistent with analyses that suggest recognition is a far easier cognitive task than open ended recall, but takes **a** rather restricted view of what the visitor might gain in terms of learning from a visit to the museum.

Beer, V. (1987). Great Expectations: Do museums know what visitors are doing? *Curator,* 30 (3), *206-215.*

Researchers investigated the behaviour of visitors, as well as the discrepancies between actual visitor behaviour and the beliefs of museurn staff about visitor behaviour. Museum staff consistently overestimate the time visitors spend at displays. 36% of museum exhibits were viewed by visitors for more than 30

seconds, **43%** of museum exhibits were skipped entirely. Whether the exhibit had text, audio, visual, movable parts, or a combination of materials was a major factor in attracting and holding visitors. The results failed to support previous findings that visitors are most likely to view exhibits to the right and near the entrance to the museum, and in fact found no consistent pattern of visitor traffic. Another unexpected outcome was that the behaviour of visitors who came to learn was not very different from the behaviour of visitors who came for casual or social reasons. Finally, neither staff nor visitors seemed concerned about evaluating the impact of displays. This study offers counter-evidence to other studies that have been done on visitor behaviour.

Birney, B. (1988). Criteria for successful museum and zoo visits: children offer guidance. *Curator,* 31(4), 292-316.

This article gives children's descriptions of their optimal learning experiences, which were very similar to what researchers define as informal learning (non-linear, self paced, voluntary, exploratory). Children did not separate acquiring information from enjoyment, but described teaching as a situation in which the content and flow of information is controlled by an adult or guide. This writer maintains there should be no debate over whether visitors learn or not; instead the debate should focus on how social context influences learning. The article emphasises the social nature of the museum experience in particular. Note the subjects' discussions of peer versus adult interaction.

Bitgood, S. (1993). What do we know about school field trips? In R.J. Hannapel (Ed.), *What Research Says About Learning in Science Museums* (Vol. Two. pp. 12-16). Washington, DC: Association of Science -Technology Centres.

The writer's suggestions are directed toward museum educators, but would be useful for teachers. Bitgood recommends front-end and formative evaluations, **as** well as pre- and post-visit classroom activities. He highlights research that shows how preparing students for the field **hip** agenda increases their focus on the instructional experiences. He also highlights research that points to affective benefits of non-information driven field trips. Bitgood's other suggestions include integrating the museum program into the school curriculum, designing appropriate field trip activities, and management skills to minimise behaviour problems.

Bitgood, S. & Cleghorn, A. (1994). Memory of objects, labels and other sensory lessons from **a** museum visit. ***Visitor*** *Behaviour,* 9 (2), 11-12.

Researchers tested the memory of 81 undergraduates after a visit to **a** natural history museum. By prompting recollections in the categories of objects, labels, and sensory experience, they found both the highest recall in the objects category, and also a direct correlation between percentage of recall and vividness of memory. Memory of objects was stronger than other types. Free-recall technique differs from prompting specific types of memories.

Black, L. A. (1990). Applying learning theory in the development of a museum learning environment. In B. Serrell (Ed.), *What Research Says **About** Learning in Science Museums* (Vol. one, pp. 23-25). Washington, DC: Association of Science-Technology Centers.

The writer advocates that museum educators need to: (1) analyse how well current exhibit practices mesh with institutional beliefs; and (2) reflect on differences

between their practices and new learning theories. This article contains a review of learning theories, including Bruner, Piaget, Bloom, Vygotsky, Gardner's apprenticeship theory. For example, Bruner's work on discovery learning has been very influential in museums. Discovery learning has gradually been replaced with learning to discover. The writer discusses how learning theories can be presented as useful research for museum practitioners.

Borun, M. & Dritas, J. (1997). Developing Family-Friendly Exhibits. *Curator,* 40(3), 178-196.

Article seeks to assist in understanding family learning in science museums. The writers identified 7 characteristics of successful exhibits, including: multi-sided, multi-user, accessible to both children and adults, served by easily readable text, and relevant to visitor's existing knowledge or experience. The methodology for this research included developing mock-ups, observing and recording family interactions on observation checklists, and conducting open-ended interviews that included both attitude- and content- based questions. The article stresses the development, evaluation, and revision cycles. It gives detailed descriptions of these exhibits and the changes that were implemented.

Borun, M., Chambers, M.B., Dritsas, J. & Johnson, J.I. (1997). Enhancing family learning through exhibits. *Curator,* 40 (4), 295-297.

In this reported study, 50 family groups at each exhibit were observed as controls. Their behaviour and conversation were unobtrusively observed and narrated into a microcassette. Researchers assessed learning indirectly, using five behavioural criteria previously determined to show that learning was taking place: ask a question; answer a question; comment on, or explain the exhibit; read the text silently; read the text aloud. These are termed "performance indicators". The article is interesting in its method of analysing family group behaviour and in the use of performance indicators rather than overt testing to infer the degree of learning.

Borun, M., Cleghorn, A. & Garfield, C. (1995). Family learning in museums: A bibliographic review. *Curator,* 38 (4), 262-270.

Authors note that while many studies infer learning from observing families in museums, no study has been done which shows a correlation between the observable behaviour of families visiting museums and an independent measure of learning. Hence, they question whether we can infer such learning from observations of behaviour. The second section of the article is an annotated bibliography, with brief reviews of individual studies of families in museums. This article provides a thorough and useful summary of existing literature on family learning in museums, and raises challenging questions about the assumptions underlying research.

Brown, L. (1989). Teaching aesthetics: The very young museum visitor. In S. Bitgood, A. Benefield, & D. Patterson (Eds.), *Visitor studies: Theory, research and practice* (Vol. 2, pp. 118-122). Jacksonville, AL: Center for Social Design.

The writer advocates teaching aesthetics to very young children (age 4) and describes her teaching methods both in classroom and art museum. Her focus on aesthetics is based on the four art teaching goals enumerated in the Getty Center's 1985 report: creation, history, criticism, and aesthetics. She believes that only

aesthetics is appropriate for young children in an art gallery. She states three goals.. . children will learn to look, to distinguish, and to love.

Callanan, M. A. & Oakes, L. M. (1992). Pre-schoolers' questions and parents' explanations: causal thinking in everyday activity. *Cognitive Development,* 7 (?), 213-233.

The findings in this study show that even young children are able to generate complex questions about everyday phenomena, and that, even in everyday informal situations around the home, children and parents are engaging in explanatory behaviour to facilitate learning. Studies of parent-child explanations in a museum would be a fruitful extension to this research.

Callanan, **M.A.,** Shrager, J. & Moore, J.L. (1995). Parent-child collaborative explanations: Methods of identification and analysis. *Journal of Learning Sciences,* 4(1), 105-129.

This study's primary contribution to the literature is its discussion of methodological considerations and its findings about the nature of parent-child explanations. It contains a method for coding of explanations, and discusses the challenges of identifying explanations within the stream of speech, identifying sub-categories. The focus of this article is on the study of explanations between parents and children as a means of studying learning in a social context .

Carson, Cary. (1994). Lost in the fun house: A commentary on anthropologists' first contact with history museums. *Journal of American History,* 81 (1), 137-150.

The article focuses on issues of preparing the message for the public, and on internal organisation, rather than on visitor experience. Carson's commentary, as well as the article by Gable and Handler, raises the important issue of the impact that interpreters' training has on visitors' learning experiences in museums.

Crane, V., Nicholson, H., Chen, M. & Bitgood, S. (1994). *Informal science learning: What research says about television, science museums, and community-based projects.* Dedham, MA: Research Communications Ltd.
This book reviews science learning research from a range of informal settings. The chapter by Bitgood et al is a very relevant history and review about museum visitor studies. Chapters on television viewing and community programmes cover methodological problems relevant to studying museum learning. There is a good discussion of instruments used for measuring attitude change, and calls for a more theoretical framework to informal education studies.

Csikszentmihalyi, M., & Hermanson, K. (1995). Intrinsic motivation in museums: What makes visitors want to learn? *Museum News,* 74 (3), 34-37, 59-61.

The writers contrast extrinsic and intrinsic motivation, pointing out that schools rely on extrinsic motivation to enforce learning. Since museums do not usually use enforced learning, they must rely on intrinsic motivation. A discussion on conditions for the "flow experience" are examined, as a model for how exhibits can be intrinsically rewarding. The writers appeal for more museums to take an experimental approach to their exhibits by becoming more active learning institutions. Csikszentmahalyi and Hermanson's specific description of learning

provides a useful starting point for a more in-depth exploration of the definition of learning in informal environments.

Dana, J.C. (1917). The gloom of the museum. (Vol.2). Woodstock, VT: Elm Tree Press.

In this second volume of a series, Dana, the founder of the Newark (New jersey) Museum, critiques American art museums, and paints his vision of museums for the future. The gloom of the museum refers to Dana's description of art museums that have been established on European models as temples to house the art collections of the wealthy.

Dana, J.C. (1917a). The new museum. (Vol.1). Woodstock, VT: Elm Tree Press.

In Dana's view a museum collection of expensive objects housed in a Greco-Roman style building may promote civic pride, but does not serve community needs. Instead, museums should grow naturally out of the life of the community, and should collect and exhibit local artefacts that illustrate the community's history, natural history, arts and crafts, and industrial products. Notable in the section on advice to museums, is Dana's recommendation that museums should not spend money on precious objects, but instead on brains that know how to tell an interesting and instructive story about the objects. His vision of a museum that is both indigenous to and an educator of the local community, continues to be a forceful and influential idea in the museum literature.

Diamond, J. (1994). Sex differences in science museums: A review. *Curator,* 37 (1), 17-24.

The findings in this study suggest either that boys interact with exhibits more independently than do girls, or that in the museum context, mothers and fathers engage their sons and daughters differently. The exhibits and programs reinforce boys' more positive attitude towards science. Diamond's brief review focuses on behaviours in museums, not on learning outcomes nor learning processes. This article is of particular use for those interested in motivational and gender issues in science museum learning environments.

Doering, Z. D. & Pekarik, A.J. (1996). Questioning the entrance narrative. *Journal of Museum Education,* 21 (3), 20-22.

Doering and Pekarik, of the Smithsonian's Institutional Studies office, discuss the connection between the visitor's entrance narrative, particularly its emotional dimension, and learning in museums. The authors raise the question of how museum educators define a learning experience in a museum: Is learning the process of adding some information or experiencing some inspiration that is provided by the museum's message and which visitors can fit into their own narrative? Or is learning achieved by provoking deep questioning when the museum's message, radically at odds with the visitor's narrative, leads visitors to question either their own views, or the authority of the museum itself; and hence to become aware that museum exhibits do not represent objective truth, but are created by people with particular intentions and viewpoints?

Eason, L.P. & Linn, M. (1976). Evaluation of the effectiveness of participatory exhibits. *Curator,* 19(1), **45-62.**

The authors evaluate the effectiveness of eight participatory exhibits in the Lawrence Hall of Science. The eight exhibits were divided into the two participatory categories of visitor-operated demonstration machines, and open-ended exploratory activity booths. Although there was no significant difference between the two types of participatory exhibits, the authors felt that the data indicated that machine exhibits communicate principles slightly better than booths, while booths communicate manipulative skills better.

Efland, A.D. (1993). Teaching and learning in the arts. *Arts EducatiOn Policy Review,* 94(3), **26-29.**

As the last article in a symposium on the nature of learning and expertise in the visual arts, Efland discusses the implications for teaching and learning that the articles written by Koroscik (1993a), Kowalchuk (1993), and Short (1993) suggest. Efland makes the point that teaching will differ in well-structured domains (such as science) from ill-structured domains (such as art) because in ill-structured domains the teacher has to be aware that the knowledge structures are more complex and require a case-by-case approach. The author summarises the implications for teaching and learning from the three articles by listing nine important points including reductive bias, contextual cues in teaching and student assessment, and pedagogical content knowledge.

Eideken, L.R. (1992). Children's museums: The serious business of wonder, play and learning. *Curator,* 35(1), 21-27.

Eideken outlines the history, philosophy and purpose of children's museums. The article elucidates the special learning environment afforded by children's museums. The author states that children's and youth museums, unlike traditional museums, have been established primarily for educational purposes: their aim is to encourage curiosity, to create a sense of wonder, and to promote learning through direct, emotional contact with objects. Among the hallmarks of children's museums are the value they attach to the function of play in learning, their willingness to address sensitive topics, and their practice of developmental appropriateness in exhibit design. They seek strong partnerships with schools. Exhibit design and programming are informed **by** the theories of Piaget, Gardner, Federstein, Vygotsky, and Csikszentminhali. Their audience is included in the decision-making process and their education staff is given and enhanced role in exhibit design. Eideken takes note of museum professionals' recent focus on a research agenda for informal leaning in children's museums.

Eisner, E.W. (1993). The emergence of new paradigms for educational research. *Art Education,* 46(6), 50-55.

This paper is a generalised discussion of research methodology, with references to western philosophic traditions. Eisner notes the growing acceptance in the educational research community of qualitative methodologies, in which the voice of the researcher is included, and which allow for nuance, interpretation, and attention to the particular and the practical. This qualitative approach to knowledge is ideally suited to arts research and education. It will promote an arts research agenda that will investigate the nature of reaching and the distinctive kinds of learning that occur in the art classroom. Eisner believes that this new approach to research in the arts can coexist with the traditional quantitative methods of educational researchers.

Eisner, E.W. (1998). Does experience in the arts boost academic achievement? *Art Education,* 5(1), 7-15.

Eisner examines the claim that arts education improves academic achievement, and offers his own three-tiered model of desirable outcomes for arts education. Reviewing relevant studies, he finds very little evidence that experience in the arts contributes to higher academic achievement. He believes that it is dangerous to base the argument for arts education on what he characterises as the ancillary outcome of academic achievement. It is more useful to identify two other tiers of outcomes, namely arts-based outcomes and arts-related outcomes. In this context he elaborates four outcomes that emerge from arts education: a feel for the process of creating an art form, an awareness of aesthetic qualities in art and life, an understanding that art is created within a cultural context, and a disposition that favours imagination, ambiguities and multiple perspectives. These outcomes are the primary justification for arts education, and need to be so recognised by educators.

Eratuuli, M. & Sneider, C. (1990). The experiences of visitors in a physics discovery room. *Science Education,* 74(4), 481-493.

Eratuuli and Sneider use observations and a self-administered questionnaire to assess the experiences of visitors to a physics exhibit. The authors focus on specific questions including demographics, motivation, and the relationship between understanding and enjoyment. They show that teamwork and creativity are important aspects of visitor interactions. There is some discussion of gender-related behaviours. The authors conclude that a majority of visitors do not just randomly manipulate the exhibit, but engage in learning activities that lead to enjoyment and understanding.

Falk, J. (1991) Analysis of the behavior of family visitors in history museums: The National Museum of Natural History. *Curator,* 34(1), 44-50.

This study by Falk builds on a study at the Florida State Museum that showed that family visitor behaviour was strongly influenced by the elapsed time of the visit. Analysis of the data showed that visits typically had four components: Orientation (3-10 minutes); Intensive looking (15-40 minutes); Exhibit cruising (20-45 minutes); and Leave taking (3-10 minutes). Falk concludes that this data, along with the earlier study, confirms that family museum behaviour is orderly and predictable, although additional research is necessary to generalise this to other types of museums. The conclusion that exhibits viewed at different times during the visit evoke different behaviour should by taken into consideration as a possible variable in research on learning in museums.

Falk, J.H. (1982). The use of time as a measure of visitor behavior and exhibit effectiveness. *Journal of Museum Education: Roundtable Reports,* 7(4), 10-13.

Falk briefly reviews the literature on researchers' use of the time spent by visitors in museums as an index of visitor behaviour and exhibit effectiveness. Based on this review, he considers the use of time in museum planning in two ways. First, Falk argues against using the holding power of an exhibit, expressed in an average of seconds or minutes, as a planning device. He proposes alternative ways of interpreting the time data. In his second approach, Falk compares the behaviour of museum visitors to department store shoppers. He suggests that although museum visitors have a limited amount of time at the museum, museums' appropriation of proven retail strategies may turn them into serious buyers; one example is offering information at varying levels of sophistication, rather than "one size fits all".

Falk, J.H. (1983b). Time and behavior as predictors of learning. *Science Education,* 67(2), 267-276.

This study by Falk was initiated as a feasibility study to test the hypothesis that observable behaviour and time can be used to predict learning. Observation used ten behaviour categories with weighing that indicated how much they contributed to learning, e.g. **4** - looking at graphic display, and 0 - playing with peer. **Data** analysis shows that the interaction of time and behaviour is an important factor in the learning process.

Falk, J.H. (1993a). Assessing the impact of exhibit arrangement on visitor behavior and learning. *Curator,* 36(2), 133-146.

Falk worked with a design team at the National Museum of Natural History (Smithsonian) to test a prototype exhibition. The primary goal discussed in this study was to examine whether different sequencing of exhibit elements would alter visitor behaviour and learning. Falk tested two different floor plans: the structured mode, set up so that visitors followed a designated route; and the unstructured mode, in which visitors could choose their own route. Quantitative data showed that the learning outcomes, as defined by the museum staff, were comparable for visitors in both structured and unstructured mode. However, qualitative measures revealed that visitors to the unstructured version found the exhibition more appealing, and that they also better understood the overall message.

Falk, J.H. & Dierking, L.D. (1990). The effect of visitation frequency on long-term recollection. In S. Bitgood (Ed.) *Visitor studies: Proceedings of the 3rd annual visitor studies conference* (pp.94-104). Jacksonville, **AL:** Centre for Social Design.

Falk and Dierking report the results of their study of twelve museum professionals recalling their early museum experiences. Overall, the authors found that memories of museum visits were closely linked with the social occasion rather that the museum visit itself (i.e., a family vacation, or a field trip). The authors acknowledge the limitations of their study in terms of generalisability, but they conclude that the results of this study reinforce the idea that museum experiences are recalled within larger social, physical, and temporal contexts. Although this study does not measure learning directly, it does suggest the long-term impact that museum visits can have on children, especially from an affective perspective.

Falk, J.H. & Deirking, L.D. (1992). *The Museum Experience.* Washington, DC: Whalesback Books.

Falk and Dierking propose a comprehensive framework for understanding people's museum experiences. This framework, the Interactive Experience Model, represents a dynamic process that occurs at the intersection of three overlapping contexts, each of which influences a visitor's museum learning experience. These contexts are: *personal* - the expectations and anticipated outcomes each person has for the visit; *social* - the people visitors come into contact with while at the museum; and *physical* - the museum environment, including building structure and the type of exhibits. The authors devote a section of the book to learning theory and its application to learning in museums. Finally, they offer suggestions to museum professionals for creating and evaluating exhibits in a way that takes into account what is known about visitors' needs and levels of knowledge so that museums can have the greatest impact and visitors feel satisfied with their experience.

Falk, J.H. & Dierking, L.D. (1997). School field trips: Assessing their long-term impact. *Curator,* 40(3), 211-218.

Falk and Dierking conducted a survey to assess individuals' memories of field visits from school. They ground this article in a discussion of learning and memory. In contrast to a factoid view of memory they report that memory is considered to be heavily situated in contexts of time, place, social meaning, and events. They suggest that memory of this type should be considered a form of learning. The authors take the results of their survey to mean that field trips to museums are consequential experiences and that remembering these experiences constitutes evidence of learning from them. They point to the specificity of details in many of the individuals' recollections, and the complex emotive content of the memories as evidence for the learning claim.

Farmer, D.W. (1995). Children take learning into their own hands. *Childhood Education,* 71(3), 168-169.

Farmer samples the exhibits, activities, and educational philosophy of five American children's museums. He quotes explanations from the museums' administrators for the success of this type of institution, namely that children, regardless of their learning style, can create their own learning experiences when museums provide developmentally-appropriate, interactive activities. These museums see themselves as vital loci for informal education - for all age groups. The authors note that children's interaction with both the materials in the museum, and with the adults who accompany them, results in learning which can be expanded at home.

Franco, Barbara. (1994), The communication conundrum: What is the message? Who is listening? *The Journal of American History,* 81(1), 151-163.

This is the third segment of a three-part roundtable discussion, *Who decides what history museums present?* (See also Gable & Handler, 1994; Carson, 1994). Franco contrasts the views about history held by professional historians and by the public. According to Franco, the historical profession has adopted the objectivity of the scientific method to guide its inquiries, and has viewed human history as a linear progression. The public, on the other hand, tends to understand history as a set of facts, and to become engaged with the past through personal or emotional connections. Franco describes how this tension between opposing views of history, and between researchers and the interpreters of exhibits for the public, was resolved in the design process for exhibits at the new Minnesota History Center. She argues for a public voice in decisions about history exhibits, and for exhibits which, while based on impeccable scholarship, also engage the visitor's emotions.

Gelman, R., Massey, C.M., & McManus, M. (1991). Characterizing supporting environments for cognitive development: Lessons from children in a museum. In L. Resnick & J. Levine (Eds.), *Perspectives on socially shared cognition* (pp.226-256). Washington, DC: American Psychology Society.

The authors report the results of their research on museum learning at the Please Touch Museum in Philadelphia. The article discusses several carefully conducted studies which explore how children learn in museums and the degree to which parents facilitate this process. They report that the presence of a computerised audio script which explains to children how to use a display increased the quality of their interactions with the display in several ways. The authors conclude by discussing their findings in light of constructivist theories of learning. They discuss the importance of providing children with multiple and redundant sources of information in a learning situation so that their cognitive development is supported (eg., an adult and a computer explaining an exhibit).

Gilman, B.I. (1923). *Museum ideals of purpose and method.* Cambridge, MA: Harvard University Press.

Gilman lays out the philosophy and practices that characterise a museum of fine art. In the first section on purpose, Gilman states that the primary aim of an art museum is to collect and exhibit art and not to educate, and that the primary purpose in viewing art is not to learn but to experience the same emotions that the artist experienced in the act of creation. In the second section on methods, Gilman considers the physical environment, the management of the museum, and the means for interpreting its contents. It is here that he discusses the two topics for which he is best remembered: museum fatigue and museum docents. Gilman relates museum fatigue to the poor ergonomic design of cabinets used to house art objects. He describes the docent as a companion who both awakens a love of art in the visitor, and explains the intention of the artist. Sharply distinguishing between informal gallery teaching by a docent and formal education by schools, Gilman emphasises that his museum has no need for a separate education department because the docent responsibility has been taken on by existing staff members. The book lacks coherence, in part because the justification that Gilman offers for some of the practices tends to contradict his stated philosophy.

Goode, G.B. (1889). *Museum-history and museums of history.* Papers of the American History Association, 3(?), 253-275.

In this 1888 address to the American Historical Association, Goode outlines the history of museums (primarily science and art museums), discusses their purposes and organisation, contrasts their methods and audience to those of Libraries, and comments on the application of museum methods to historical studies. With respect to the purposes of museums, Goode generalises from the stated mission of the Srnithsonian: a museum's function is to contribute both to the advancement and to the diffusion of knowledge. Goode distinguishes between a museum's research collections which are intended for the private study of scholars in the service of advancing knowledge, and its exhibition collections which are displayed for the education and entertainment of the public in the service of diffusing knowledge. Goode's implicit conception of learning is that the museum transmits discipline-based knowledge to the visitor by way of exhibits and accompanying comprehensive labels, to be supplemented by reference books, which should answer "all probable questions of the visitor".

Goode, G.B. (1891). *The museums of the future.* In G.B. Goode (Ed.), Smithsonian Institution report of the National Museum, 1888-1889. Washington, DC: Government Printing Office.

This article is a reworked version of Goode's 1888 address to the American Historical Association (see previous annotation). He offers advice to new museums and their administrators, and stresses the public and educational function of museums - especially local museums - while at the same time affirming their research responsibilities. He foresees that museums of the future will be an agency "for the enlightenment of the people". In conjunction with a discussion of the differences between libraries and museums, Goode also makes a distinction between art galleries and art museums, the distinction being that art museums have adopted a "scientific method of installation".

Greenfield, **T.A.** (1995b). Sex differences in science museum exhibit attraction. *Journal of Research in Science Teaching,* 32(9), 925-938.

Greenfield studied the attraction of different types of interactive exhibits for females and males. The study used an exhibition which consisted of exhibits about the himan body, physical science principles, and several varieties of puzzles (including mazes and

computer games). Both boys and girls used all types of exhibits, but boys were more likely than girls to use computers and exhibits illustrating physical science principles. Girls were more likely than boys to use puzzles and exhibits focussing on the human body. But these behaviours were less characteristic of children accompanied by parents (in contrast to schools groups). Greenfield comments on evidence of cooperative problem solving and the incidence of adults helping children. Finally, he details four ways to ensure that exhibits will be of most benefit to the most students: (1) design activities to parallel children's interests; (2) structure hands-on activities more as problem solving than cookbook situations; (3) structure activities to require sustained attention to produce results; (4) ensure that all students have access to all activities.

Greenglass, D.I. (1986). Learning from objects in a museum. *Curator,* 29(1), 53-66.

Greenglass describes and educational experiment conducted in the museum context. He starts by assuming the cognitive orientation of the learner, that is, casting **people** as either high or low on their ability to conceptually structure information. The assumption is that individuals with low capacity for conceptually organising experiences need a high structure in their museum experiences, while those with a higher capacity would benefit from a less structured environment. Such a simplistic view of human capacities and experiences is no longer accepted by most serious psychologists or educators. The basic design of the study was to expose two groups (high and low) to two different conditions of museum instruction (discovery and directed). As expected, those classified as 'low' learned the most when they were exposed to the more structured settings. Interestingly, individuals classified as 'high', also learned more from the more structured setting, although not significantly so.

Griffin, J. & Symington, D. (1997). Moving from task-oriented learning strategies on school excursions to museums. *Science Education (Informal Science Education - Special Issue),* 81(6), --.

This study of 12 group visits (30 classes) to a national museum and a science centre focused on how teachers prepare for and integrate classroom and field study. Results showed that few teachers linked classroom and excursion in any way wither before, during, or after the visit. Those who had a learning orientation were also those who linked the visit with topics being studied. The authors discuss characteristics of teacher and student behaviour and attitude on trips, showing that most did not take advantage of learning opportunities offered by museums. They point to research on family visits and on constructivist theory and propose a model for a learning oriented excursion. They make recommendations for visit guidelines.

Gurian, E.H. (1995). A blurring of boundaries. *Curator,* 38(1), 31-37.

Gurian explores the definition of museums as institutions which focus on the preservation and display of inherently valuable objects, and expands that definition to include institutions which preserve cultural memory. To illustrate this point, she cites three examples: (1) the U.S. Holocaust Memorial Museum, where artifacts serve to support the text-heavy narrative of the exhibition; (2) native American museums, where both tribal and curatorial voices interpret the native experience, and where dance and storytelling are seen to be as important as artifacts in transmitting cultural values; and (3) hands-on science museums, where viewing authentic artifacts is not the essence of the museum experience. By broadening their scope, museums can serve as places where visitors create their own meaning, and learn in their own way.

Harrison, M. (1970). *Learning out of school: A teachers' guide to the educational uses of museums*. London: Wardlock Educational, Ltd.

Harrison describes the philosophy and benefits of museum visits by school children, and offers guidelines for planning these trips. She outlines recent trends in education that pertain to learning outside the classroom, including the goals of widening students' horizons, connecting knowledge to personal experience, encouraging active learning, breaking down disciplinary barriers, and preparing students for lifelong leisure pursuits. Harrison then explores the potential that school visits to museums offer for learning and for other positive experiences; namely the opportunity of seeing and handling "real things", stimulating the imagination, widening students' horizons, and introducing students to new ideas and interests for lifelong enjoyment. She suggests numerous activities that teachers might plan both during and after the museum visit in order to foster a successful experience for the children.

Hein, G.E. (October, 1995). *Constructivism and museums*. Paper presented at the annual meeting of the Association of Science-Technology Centres, San Diego, CA.

Hein began his presentation with an overview of the increasing scope of education in museums. He pointed to areas of research (developmental theory and cognitive psychology) that have led to the establishment of informal learning as a discipline. He outlined some of the decisions about educational intentions necessary for museum education programs: educational goals, knowing the audience, and teaching methods. Hein then described an organising scheme for museum education (as outlined in the following annotatiion). He used this format to compare education and types of museums (behaviourist learning and the orderly museum; constructivism and the constructivist museum). Hein concluded by describing components of the constructivist museum: making connections to the familiar, providing multiple modalities and additional resources, social interaction, and learner's motivation.

Hein, G.E. (1995). The constructivist museum. *Journal of Education in Museums* (16), 21-23.

Hein presents a review of how constructivism is a particularly appropriate basis for museum education. He begins by considering two fundamental elements of all educational theories: a theory of knowledge (epistemology) and a theory of learning (psychology). Hein describes the extreme positions of epistemology as knowledge independent of learner (realism) and knowledge in the mind constructed by the learner. The extreme positions of psychology of learning are learning is incremental (adding to a tabula rasa) and learning is constructed meaning. Hein combines these two continuums to create four quadrants, each representing a different approach to education. The author uses these quadrants to compare types of education and types of museums. He then describes components of the constructivist museum: lack of predetermined sequence; providing multiple modalities; and providing opportunities for the visitor to make connections with familiar objects. In conclusion, Hein highlights the responsive nature of a museum that takes both epistemology and psychology into consideration - the constructivist museum maximises the potential for learning.

Henry, C. (1995). Parallels between student responses to works of art and existing aesthetic theory. *Studies in Art Education, 37(*1), 47-54.

Henry investigates middle school students' recall 18 months after their visit to an art museum. Participant were asked to "tell everything you can remember" about going to the art museum. Results indicated that 43% of the students made statements corresponding to qualities found in aesthetic theory, even though students had received

no prior instruction in this area. Henry concludes that students should be given the opportunity to use existing aesthetic theories of art and suggests that teachers could use a visit to an art museum to develop an understanding of aesthetic theories in students which would allow them to formally critique the art work.

Hood, M.G. & Roberts, L.C. (1994). Neither too young nor too old: A comparison of visitor characteristics. *Curator,* 37(1), 36-45.

The authors conducted a year-long survey of over 2000 adult visitors to the Chicago Botanic Garden, for use in master planning. This article reports data on the two age extremes: seniors (age 55+ - 40% of the audience) and 18-34 year olds (20%). Results showed that the seniors were the age group most interested in structured programming, and that they preferred audiovisual presentations, tour guides, and staff members to answer questions. Younger visitors came for a more casual experience, but when they did take advantage of programming, they preferred family discovery activities and hands-on exhibits.

Housen, A. (1992). Validating a measure of aesthetic development for museums and schools. *ILVS Review,* 2(2), 213-237.

Housen describes the validation of a Piagetian-like stage-based instrument (Aesthetic Development Instrument, ADI) for assessing young students' artistic appreciation and analysis. The article presents data that both offer support for the validation of the particular instrument and demonstrate its utility as an evaluation tool. The instrument is used to locate the open-ended ("stream of consciousness" or, in more cognitive terms, a think-aloud protocol) responses of a student along a five-level (plus five transition levels) developmental scale. The scale is constructed theoretically with carefully determined boundaries. Housen used the ADI measures to show that students exposed to a multi-year art museum experience generally performed at a higher stage than control students.

Housen, A. (1996). *Studies on aesthetic development.* Minneapolis: American Association of Museums Sourcebook.

Housen outlines the five stages of aesthetic development which she has codified from conducting over 2000 stream-of-consciousness interviews with subjects while they were viewing two works of art. She found that the degree of exposure to visual arts is the main factor correlating with a progression from a naïve to a sophisticated aesthetic stage. She has applied the insights gleaned from these interviews to develop the Visual Thinking Strategies Curriculum, a series of lesson plans intended for use by classroom teachers in both school and museum settings. Ongoing testing of this curriculum in four venues demonstrates that the mentoring of classroom teachers by museum staff, on order to involve students directly in their own aesthetic development, is highly effective.

Jacob, E. (1992). Culture, contest and cognition. In M.D. LeCompte, W.L. Millroy, & J. Preissly (Eds.), *The handbook of qualitative research in education* (pp. 293-335). New York: Academic Press.

Jacob discusses the influence of cultural factors and social context on student learning from a neo-Vygotskian perspective. She summarises the contribution of the approach by noting that this work has shifted the focus to understanding the processes that occur in specific contexts rather than focusing on outcomes. In addition, the unit of analysis has shifted from the isolated individual or an entire group to activities char individuals

perform in a specific setting. This chapter has important implications for research on learning in museums.

Jarrett, J.E. (1986). Learning from developmental testing of exhibits. *Curator,* 29(4), 295-306.

Jarrett details the process of exhibit design based on front-end formative evaluation. The article reports how an exhibit on evolution was improved through a process of interviewing visitors as they responded to various versions of an exhibit. The report emphasises the role of scientist and designer but not of educator in exhibit construction, and makes limited use of learning theory, emphasising instead communication theory.

Jensen, N. (1994). Children's perceptions of their museum experiences: **A** contextual perspective. *Children's Environments,* 1 1(4), 300-324.

Jensen examined the cumulative effects of museum experiences on a diverse group of 30 New York City children aged 9 and 10. She describes a study that addresses the question, How do children categorise their museum experiences? The results tend to show that background, interest, and desire for autonomy, are the strongest factors in determining positive affect toward museums. Jensen takes a combined constructivist and social contextual view of the child in the museum. The review also emphasises the powerful role of the family in helping the child to see him/herself within the context of the museurn - in helping the child to familiarise and come to enjoy the museum.
Kindler, **A.M.** (in press). Aesthetic development and learning in **art** museums: **A** challenge to enjoy. *Journal of Museum Education (Special Issue on Learning Research).*

This paper criticises the emphasis that typical museum education programs place on having visitors learn facts, information about artists, and the historical, political, and social context of artwork. Kindler contends that an equally important dimension, uniquely available in the museurn, yet not explicitly promoted by it, is aesthetic appreciation that leads the viewer to connect with art in a deeply personal way and experience learning about the self. She argues for the value of enjoying and being excited about art; increasing the visitors' "visual appetite" is an important goal for museum educators.

Koran, J.J., Foster, J.S., & Koran, M.L. (1989). *The relationship among interest, attention and learning in a natural history museum.* Proceedings of the annual Visitor Studies Conference, Jacksonville, AL.

This article fills a very important niche in the research literature on museum evaluation and visitor studies by reporting empirical results confirming the previously assumed connection between attention and learning, Results of the study, indicated a significant relationship between attention and amount of learning, with greater attention yielding higher test scores. Increased interest also resulted in greater attention; but it was attention which accounted for the most variance.

Koran, J.J., Koran, M.L., Foster, J., & Dierking, L. (1988). Using modeling to direct attention. *Curator,* 31(1), 36-42.

The authors studied the effectiveness of using live models to stimulate appropriate visitor behaviour at exhibits in a natural history museum. Referring to earlier research by Bandura and others that indicate learning is enhanced by observing modelled behaviour, the authors claim their findings demonstrated the value of modelling for enhancing learning in museums

Koran, J.J., Koran, M.L., & Longino, S.J. (1986). The relationship of age, sex, attention, and holding power with two types of science exhibits. *Curator,* 29(3), 227-235.

This study found that for all ages, both attention and holding power (length of time at the exhibit) increased when visitors could manipulate objects; holding power was greater for younger visitors and for female visitors. The researchers indicate that if curiosity behaviour is a prerequisite for learning, then exhibit designers can facilitate the learning process by allowing for direct manipulation of objects. The study focuses on visitor behaviour, rather than leaming processes.

Korn, R. (1988b). Self-guiding brochures: **An** evaluation. *Curator,* 31(1), 9-19.

Korn studied the effectiveness of two types of self-guided interpretive brochures used at the Japanese Garden in the Chicago Botanical Garden. She tested adult visitors using a declarative-style brochure and those using an inquiry-style brochure, and then compared both to a control group that received no brochure. Results showed that the two experimental groups learned significantly more than the control group, but that there was no significant difference in their level of learning. These findings are inconsistent with other research on indoor museum labels (Parsons 1968; Lakota 1976), which has found inquiry-style text a more effective interpretive tool. Korn proposes that the inconsistency may be due to the difference between indoor and outdoor learning environments, and visitor expectations for each.

Korn, R. (1993). Critical reflections. *Curator,* 36(4), 251-255.

Korn examines the relationship of museum evaluation to exhibit development. While she applauds the use of evaluation to study visitor experience with exhibits, she argues that evaluation by exhibit developers should move beyond the measurement of cognitive outcomes, to explore affective, social, and other outcomes of museum visits. She proposes that one way to proceed is to record visitors' reactions to exhibits, which are not necessarily quantifiable, and then to analyse these findings to guide the objectives of future exhibits. Korn contrasts her visitor-centred approach to the museum experience with the cognitive-centred goals of many exhibit developers.

Korn, R. (1995). An analysis of differences between visitors at natural history museums and science centers. *Curator,* 38(3), 150-160.

Korn conducted a study which would travel to natural history museums and science centres, to determine differences between the audiences at the two types of institutions. She collected data on issues of demographics, group composition, and visitor preferences for various interpretive strategies. Although she found little difference in demographics between the two types of institutions, visitors to science centres came in larger groups, and the groups had more children. In the category of visitor preference for mode of interpretation, she found that adults in both settings consistently preferred live demonstrations or explainers. Kom suggests that the divergent visitor ratings given to other interpretive strategies such as computer games **and** dioramas may be the result of different visitor expectations at the two types of museums. To accommodate all preferences, Korn recommends that an exhibition which travels to the two types of museums include a variety of interpretative techniques.

Koroscik, J.S. (1997). What potential do young people have for understanding works of art? In A. M. Kindler (Ed.), *Child development in art* (pp.143-164). Reston, VA: National Association for Education in the Arts.

Koroscik draws upon cognitive, rather than the more traditional developmental research to discuss what it means to understand works of art, the potential understandings of works of art, and the obstacles to the development of this understanding. She explains that three facets of cognition interact to build an understanding of works of art: a knowledge base, appropriate search strategies, and disposition towards learning. Conversely, problems relating to any of these three components will hinder learning, as will an inability to transfer knowledge or skills from one leaning situation to another. Koroscik's learning model for art is a continuum between the novice's poor knowledge base, ineffective search strategies, and low motivation, and the expert's rich knowledge base, sophisticated search strategies, and high motivation. The author elaborates on her model by quoting novice and expert comments on a single artwork. Urging art educators to be aware that each student and each art experience is unique, Koroscik recommends that educators use her model to diagnose student problems in understanding art, and to promote appropriate transfer from one situation to another.

Kremer, K.B. & Mullins, G.W. (1992). Children's gender behavior at science museum exhibits. *Curator,* 35(1), 39-48.

The authors report gender behaviour of children, kindergarten to third grade, at the Kidspace interactive exhibits of the Center of Science and Industry, Columbus, Ohio. The authors chose five exhibits for their observations of holding power, gender ratio, gender behaviour, and adult and peer interactions. The study concludes with recommendations for the design of science exhibits which foster cross-gender skills, and for design and programming which target girls.

Kropf, M.B. & Wolins, I.S. (1989). How families learn: Considerations for program development. *Marriage and Family Review,* 13(4), 75-86.

The authors review research on families in museums and theories of learning to suggest ways in which families can learn more from their museum experience. The authors base their arguments on the premise that learning in museums is object-oriented and that the most effective instruction is experience-based. They note that current literature on families in museums focuses on family behaviour rather than learning, and discuss theories of learning which focus on learning as a shared and social experience. The importance they attach to adult's influence on childrens' learning comes from their review of Vygotskian theories and apprenticeship models of learning. In this context, the authors address issues of motivation and transfer of learning by recommending that research should motivate families to increase the amount of mental effort they expend in the museum environment; and that educational programs should teach families skills they could transfer to their own unguided experience in the museum.

Lave, J. & Wegner, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, England: Cambridge University Press.

The authors define learning as being situated in communities of practice, rather than within the minds of individuals as cognitive psychologists have traditionally assumed. The term *community of practice* is defined as the participation in an activity system about which participants share a common identity and motivation. They use the term *legitimate peripheral participation* to refer to active and gradually increasing participation in communities of practice, which results in learning - situated learning. The authors emphasise an apprenticeship model for learning, in which learning occurs as newcomers

gradually increase their participation in communities of practice and gain access to a wide range of ongoing activities and resources in the form of interactions with masters, other newcomers, information, and opportunities for participation. To illustrate legitimate peripheral participation, the authors present five ethnographic case studies of apprenticeship from different cultural and historical traditions. Based upon these case studies, the authors draw several conclusions about the nature of legitimate peripheral participation within communities of practice. When referring to legitimate peripheral participation, it is important to note that the term was not intended to be a teaching technique, but rather an analytical perspective for understanding learning.

Leichter, H.J., Hensel, K., & Larsen, E. (1989). Families and museums: Issues and perspectives. *Marriage and Family Review,* 13(4), *15-50.*

This article looks at the museum visit as one component of the lifelong educational experience of a family unit, where each member continually educates the others. They compare the educational processes in four institutions with which families engage: television, school, health care agencies, and museums. The authors applaud family programming in museums, and remind museum professionals that education is occurring within families during their visit to museums even though it may not be apparent to an observer. They consider family conversations in museums to be fragments of longrunning discourses which began before the visit, and which will be continued far in the future.

Linn, M.C. (1983). Evaluation in the museum setting: Focus on expectations. *Education Evaluation and Policy Analysis,* 5(1), 119-127.

This is an analytic discussion based on studies conducted by Linn and others in museum evaluation. Characteristic viewpoints of the museum director, the curator, educator, the board of directors, designers, funders, and so forth are each described. Each party may expect different kinds of learning outcomes; each may have unrealistic expectations. Findings about visitors' expectations are also reviewed to show that visitors primarily have social goals for their experience. Linn recommends that evaluations focus on policy revision rather than changing individual exhibits. Evaluations should facilitate communication and allow varying viewpoints to be heard. They should involve the whole staff and include positive as well as negative critique.

Litwak, J.M. (1990). *Telling visitors what they will see won't change their minds.* American Association of Zoological Parks and Aquariums Regional Conference Proceedings, Wheeling, WV.

Litwak conducted an observational study of visitor behaviour at a special exhibit on the endangered red wolf at Oglebay's Good Children's Zoo. Noting the zoo's goal of promoting concern for endangered species, the study tested whether a large "Endangered Species" sign near the exhibit would affect visitors' time spent or label-reading behaviour. Data was collected on each visitor's age, gender, direction of approach to the exhibit, time of day, and treatment sign condition (Endangered Species, New Exhibit, or none), as well as time spent and number of labels read. Results showed no significant difference among signage conditions, indicating that "the treatment signs in this experiment were minor details in comparison to the overall picture" of what visitors were experiencing and reacting to.

Litwak, J.M. (1993). Enhancing museum learning by facilitating the visitor social agenda. In D. Thompson, A. Benefield, S.Bitgood, H. Shettel, & R. Williams (Eds.), *Visitor studies* 1992: *Theory, research and practice (Vol.5)*.Jacksonville, AL: Visitor Studies Association.

In this paper, Litwak argues that museum educators can and should capitalise on visitors' overriding social agenda in order to help people learn together in a museum setting. The author provides a brief overview of visitor studies research on museum visitors' social goals as well as some relevant research in social psychology showing that social interaction enhances learning. Focusing on three theories that address social interaction in learning - the experiential learning cycle (Kolb, 1984), social cognition (Deaux & Wrightsman, 1988), and cooperative learning (Johnson & Johnson, 1991) - Litwak suggests how these theories may be applied to the museum setting and gives specific recommendations for actions museum educators can take to facilitate visitors' "shared interpretive experiences".

Litwak, J.M. (1996). Visitors learn more from labels that ask questions. *Current Trends in Audience Research and Evaluation,* 40, 40-51.

Litwak conducted three studies at the University of Minnesota's Bell Museum of Natural History on the effect of using questions in label titles on visitors' recall and learning of the label content. Based on other research showing increased visitor attention to labels with questions, and classroom reading research showing increased learning from text containing inferential questions, these studies examined whether certain types of questions (i.e., explicit, implicit, or scriptal) or certain conditions (e.g., label length, cueing about the follow-up **quiz)** better support visitors' recall and memory of label text and/or display content. Across all three studies, higher scoring subjects self-reported reading more label content, indicating that some visitors are innate "readers" and others are not, and suggesting the need for ways to better inform non-readers. The author concludes that questions on museum labels increase learning of content but that they provide motivation rather than direction of mental processes.

Loomis, R.J. (1973). Please, not another visitor survey. *Museum News,* 52(2), 21-26.

Loomis discusses common problems with visitor surveys in museums **and** the circumstances under which surveys can be beneficial. He provides five specific suggestions for improving the quality of surveys. Loomis concludes the article by providing an annotated bibliography which lists some of the topics covered in surveys that have been done on museum audiences.

Low, T. (1942). *The **museum** as a social instrument: A study undertaken **for** the Committee on Education of the American Association of Museums.* New York: Metropolitan Museum of Art.

The Committee on Education of the American Association of Museums appointed Low to report on the educational problems of museums. While acknowledging that museums have a threefold purpose - collection, scholarship, and education - **Low** calls on museums to anchor their identity and purpose in education. He argues that museums as public institutions must reach beyond their existing audience to attract middle class adults. The author suggests that museums match their offerings to the specific pursuits of these groups, and interpret artworks as social documents of the culture, rather than from an aesthetic or **art** history perspective. He characterises learning for the adult visitor as stimulation of thought and feeling, rather than an increase in knowledge. Low's focus on the adult educational movement leads him to discount two other varieties of learning in museums. On the one hand, he advocates a diminished role for

curators and their research, which he believes belongs in universities. On the other hand, he is rather dismissive of museums' responsibility towards children, and questions whether school field trips carry over into a lifelong interest in museums.

Martin, L.M.W. (1996, April). *A Vygotskian approach to the design of a science center.* Unpublished paper presented at the annual meeting of the American Educational Research Association, New York.

In this article Martin reports on the design of the Arizona Science Center from a Vygotskian point of view. The Vygotskian approach assumes that learning about science is a sociocultural phenomenon that is fostered by interactions between novices and experts and mediated by materials and activities. Overall, this article illustrates how Vygotskian theory can be used as a framework for the design of a museum and for alternative means of communicating information which can be used in a science centre (i.e. narrative). The author offers suggestions for museum design, and stresses the importance of incorporating the sociocultural framework into research on learning.

Martin, M., Brown, S., & Russell, T. (1991). A study of child-adult interaction at a natural history centre. *Studies in Educational Evaluation,* 17(2-3)m 355-369.

The authors investigate the cognitive gain by children during their interaction with a fossil display area within the Natural History Centre at the Liverpool Museum. Observations were carried out on 51 children aged 4-17 years. Children were observed, interviewed and videotaped in three different conditions: A) child with adult, B) child with demonstrator, and C) child with adult and demonstrator. The authors conclude that their results show that children learned more and enjoyed their experience more in the presence of a demonstrator (based upon length of childrens' participation). Overall, the authors believe that this study shows that learning can be measured in an informal setting through the use of interviews and observations; and they make a distinction between studying learning in families and learning in children on a field trip to the museum.

Martinello, M.L., Cook, G.E., & Wiskemann, S. (1983). Preparing community volunteers for museum education. *Curator,* 26(1), *37-57.*

The authors describe and evaluate a training program for volunteer docents. A collaborative program between a university and a museum trains docents both in knowledge of the cultures represented in the museum and in six interactive methods of presenting the cultures to visitors. An evaluation study of the program aimed to identify the needs and concerns of the docents, their perception of their teaching role, and the effectiveness of the training program in developing docent abilities to promote learning. Using this data as a guide, the authors consider the implications for docent training and for museum learning.

Massey, C. (1993). How cognitive scientists view science learning. In R.J. Hannapel (Ed.), *What research says about learning in science museums* (Vol. *2,* pp.7-11). Washington, DC: Association of Science Technology Centers.

Massey provides a review of cognitive learning theory. She reviews research on novices and experts and emphasises that novices do not lack conceptions of how a specific scientific phenomena works; instead novices and experts simply have different conceptual structures. Learning, therefore, requires a process of changing from less sophisticated to more sophisticated conceptual organisations. Massey applied this

cognitive science research to the development of a children's museum exhibit, and provides a summary of the implications for research.

McClafferty, T.P. & Rennie, L.J. (1997, March). *A triangulation strategy to measure children's learning outcomes from an interactive exhibit.* Paper presented at the annual meeting of the National Association for Research in Science Teaching, Chicago.

This study uses data triangulation and methodological triangulation. The authors emphasise that triangulation of methodology not only captures the complexity of the informal environment, but also captures the uniqueness of the individual participant. The study exemplifies the effort to adapt methodology to capture the unique characteristics of learning in informal environments.

McManus, P.M. (1989a). Oh yes they do! How visitors read labels and interact with exhibit text. *Curator,* 32(3), 174-189.

McManus examines the commonly-held view of museum professionals that visitors do not read exhibit text. Building upon a discussion of "text-echo", she emphasises the importance of text as an interactive communication between visitor and museum staff it is the primary means by which the museum conveys its message, both as introduction to and interpretation of objects. The qualities of effective text are identified.

McManus, P.M. (1993a). Memories as indicators of the impact of museum visits. *Museum management and curatorship, 12,* 367-380.

McManus reviews previous work that looks at visitors' recollections for evidence of visit impact. Borrowing from cognitive psychology, she divides memory into declarative or semantic, procedural, and episodic types. She summarises work, primarily by Falk and Dierking and by Stevenson, on the categories of memories that visitors displayed during cued and uncued recall. Raw data is provided to illustrate each category with examples.

Melton, A.W. (1935). *Problems of installation in museums of art.* New Series. Number 14. Washington, DC: American Association of Museums.

This is the second report published by the AAM as part of an early major research program to study the effectiveness of museums as educational centres (first: Robinson, 1928). Melton, studied the effects on visitor behaviour of altering installations in the Pennsylvania Museum of Art. He conducted extensive studies of visitors' interest in art objects as measured by both spread (number of objects viewed) and duration (length of time spent with object). The chapter on methodology explains the choice of subjects and conditions of collecting data. Melton's main concern throughout his studies is the effect of display conditions on the visitor's behaviour in an art museum. He is neutral in the debate about whether the goal of education in an art museum is to increase enjoyment or to increase understanding. Whatever the goal, he assumes that the interest shown by the visitor is an index of the educational effectiveness of the display; he is not concerned with the content or process of visitor learning.

Melton, A.W., Feldman, N.G., & Mason, C.W. (1936b). *Experimental studies of the education of children in a museum of science.* New Series. Number 15. Washington, DC: American Association of Museums.

This is the third report published by the **AAM** as **part** of a major research program to study the effectiveness of museums as educational centres. Over a five-year period, the authors studied fifth through eighth grade students. During the studies the following aspects of the museum visit were varied: Pre-visit preparation, method of instruction at the museum (including ability of the docent instructor), and post-visit review or test. This early report views learning as knowledge gained in a domain, and approaches the museum experience from the tradition of formal school-based learning.

Miles, R. & Tout, A. (1991). Impact of research on the approach to the visiting public at the Natural History Museum, London. *International Journal of Science Education,* 13(5), 543-550.

In light of two visitor studies, the authors suggest that sound empirical conclusions are provided which are consistent with the emerging picture of a typical museum visit. They conclude that aside from school groups, visitors come to a museum for a variety of social reasons and that learning from the exhibits may be an ancillary motivation. **The** implication they draw from these findings is that museum exhibits should by designed with the typical visitor in mind. The result for the NHM has been a shift from cognitive to affective objectives which focus on the experience a visitor may get from **an** entire gallery rather that from individual exhibits.

Miles, R. & Tout, **A.** (1993). Holding power: To choose time is to save time. In R.J. Hannapel (Ed.), *What research says about learning in science museum* (Vol.2, pp. 17-20). Washington, DC: Association of Science Technology Centers,

The authors review research on holding power in museums - the length of time a visitor stays at an exhibit. They provide some generalisations from the studies, e.g. the average visit lasts less than two hours, of which at most only half is devoted to the exhibits. They conclude the article with recommendations for the design of exhibits, in light of the results of the holding power studies.

Morrisey, K. (1991). Visitor behavior and interactive video. *Curator,* 34(2), 109-118.

Momssey studied whether **an** interactive videodisc program could be effective **as** a conceptual pre-organiser for a special bird exhibit. The study asked three questions: a) Does interaction **with** the videodisc program increase visitor time within the exhibit itself? B) What types of visitors use the program? C) How do visitors interact with the program? Morrissey concludes that a videodisc program can function as an effective pre-organiser without competing with the exhibit. Although the article is not directly related to learning, it is a useful study of visitors' interaction with technology and of one way in which technology can impact a more traditional exhibit viewing experience.

Moussouri, T. (1997). The use of children's drawings as an evaluation tool in the museum. *Museological Review,* 4.41-50.

Moussouri writes about the use of children's drawings of their museum experience as an evaluative tool for children's spatial abilities. She discusses Gardner's (1985) theories of multiple intelligences and uses his thoughts on spatial intelligence as part of her theoretical background. She also discusses Piaget's work on spatial understanding as a framework for understanding the stages of spatial understanding that children pass through during their development. In her discussion of children's drawings, the author evaluates a few sample drawings from a Piagetian perspective, and several others from a sociocultural perspective. She concludes that drawings could be used as an evaluative tool for museum learning if this evaluation of spatial skills were made on a regular basis

and if museum educators gave children more opportunity to practice their spatial, rather than their verbal skills during their museum visit.

Munley, M.E. (1992). Back to the future: A call for coordinated research programs in museums, *Patterns in Practice: Selections from the Journal of Museum Education.* (pp. ?). Washington, DC: Museum Education Roundtable.

Munley identifies the differences between museum evaluation and museum research and offers suggestions for a research agenda for museums. Research and evaluation are very similar in terms of their methodology and their subject matter. However, the intent of research differs from evaluation in that instead of providing immediate answers, research is driven by a desire to contribute to a growing body of knowledge. The author argues that there is currently a widespread interest for research on museum learning and she offers several suggestions to begin this work. Munley also suggests two possible conceptual frameworks for a research agenda: ethnographic research to study visitor behaviours in greater depth, and the identification of outcome variables which seek to determine indicators of successful museum experiences.

Oppenheimer, F. (1968a). A rationale for a science museum. *Curator,* 11(3), 206-209.

Oppenheimer proposes that an effective way to bridge the gap between lay and expert understanding of science and technology is to build an interactive science museum, in which visitors can manipulate scientific equipment. He conceives of the science centre as a stimulating learning and teaching environment which would supplement formal educational institutions.

Paris, S.G., Yambor, K.M., & Packard, B.W.-L (in press). Hands-on biology: A museum-schools-university partnership for enhancing children's interest and learning in science. *Elementary School Journal.*

The authors discuss the findings of two studies in which they assess the impact of an extracurricular science program on children's interest and learning about biology. The conceptual framework for the curriculum is based on six characteristics: constructing personal meaning, choice, challenge, control, collaboration, and consequences that promote self-efficacy. The results of both studies showed significant increases in students' attitudes towards science and their problem solving skills from the beginning to the end of the program. For the museum community, the authors propose that this cumculum offers suggestions for the design of extracurricular science programs which include museum visits.

Peart, B. (1984). Impact of exhibit type on knowledge gain, attitudes, and behavior. *Curator,* 27(3), 220-227.

This study centres on short-term learning outcomes, as measured by visitor behaviour. It approaches learning form the perspective of a message to be communicated by exhibit design. Peart reports that a concrete exhibit containing three-dimensional objects and clear labelling is superior to an abstract, flat text-only exhibit in the following ways: attracting, holding power, stimulating interaction, and resulting in knowledge gain. He found no measurable change in attitude in any of the variations.

Perry, D.L. (1993a). Designing exhibits that motivate. In R.J. Hannapel (Ed.), *What research says about learning in science museums* (Vol.2, pp.25-29). Washington, DC: Association of Science Technology Centers.

Perry addresses two questions: What are the components of an intrinsically motivating museum exhibit experience, and How do we design such an exhibit. In her previous research, Perry identified six components of an intrinsically motivating exhibit: curiosity, confidence, challenge, control, play, and communication. In this chapter, she considers these six components and derives questions that exhibit developers might ask in designing an intrinsically motivating exhibit, using one exhibit as an example.

Perry, D.L. (1993b). Beyond cognition and affect: The anatomy of a museum exhibit. In D. Thompson, S. Bitgood, A. Benefeld, H. Shettel, & R. Williams (Eds.), *Visitor studies: Theory, research and practice* (Vol.6, pp.43-47). Jacksonvillew, AL: Center for Social Design.

Perry offers a theory of what makes museum visits successful bases upon her own museum research and upon heuristics developed by Malone and Lepper (1987). Her theory has twelve components divided into three basic expectations that people have when visiting a museum: interactions, needs, and outcomes. Perry concludes that research on designing exhibits or measuring learning needs to take into account all of these components instead of just a few as they have done in the past.

Price, S. & Hein, G.E. (1991). More than a field trip: Science programs for elementary school groups at museums. *International Journal of Science Education,* 13(5), 505-519.

Price and Hein review their 15-year data base of science program evaluations along with other research on out-of-school science activities for elementary students in order to provide general guidelines for enhancing programs at these institutions. They suggest that informal science programs not only help children learn more and better science but that such experiences also foster the development of excitement about science - especially among low-achieving or non-English-speaking students.

Ramey-Gassert, L., Walberg, H.J., III, & Walberg, B.J. (1994). Reexamining connections: Museums as science learning environments. *Science Education,* 78(4), 343-363.

The authors review science museum literature in light of the emerging trend for museums to partner with schools in order to enhance science literacy. The review includes research on learning in museums, collaborations between museums and schools, museums as learning environments, motivation, exhibit design, and assessment of learning in museums. It features a thorough comparison of formal and informal learning environments.

Rennie, L.J. & McClafferty, T. (1995). Using visits to interactive science and technology centers, museums, aquaria, and zoos to promote learning in science. *Journal of Science Teacher Education,* 6(4), 175-185.

The authors review research about learning in museums, aquaria, and zoos, and present guidelines for teachers to ensure that field trips will enhance their students' education. The article focuses on two questions, as they relate to school groups: How do science centres affect learning?; How can teachers use science centres to promote students' engagement and learning in school science? They address the first question in their literature review which includes: why visit a science centre; the visitor experience,

visitor interaction with exhibits; the structure of a visit; social context; and teacher involvement. The second part of the article uses the literature review to create guidelines for field trips.

Rennie, L.J. & McClafferty, T.P. (1996). Science centres and science learning. *Studies in Science Education* (27), 53-98.

The authors examine the role of science centres and their interactive exhibits as sources of both entertainment and education. Referring to the work of Csiksentmihalyi, Gardner, and Piaget to support the potential for visitors' learning by interacting with exhibits in science centres, they recognise that a broad definition of learning includes cognitive, social, and psychomotor outcomes. While noting the difficulty of measuring such learning because each visitor's experience is unique, the authors review studies since 1976 which aim to measure learning outcomes at science centres by using a variety of methodologies (simulated recall, open-ended questions, and the importance of context). They examine research based on such issues as school and family visits, the role of explainers, and gender effects.

Resnick, L.B. (1987). Learning in school and out. *Educational Researcher,* 16(9), 13-20.

Resnick contrasts school-based learning and everyday learning. School learning is individualistic, primarily mental, concerned with manipulating symbols, and generalised. Everyday and workplace learning is social, tool-based, contextual, and situation-specific. The discussion focuses on modes of learning and the connections between schools and the workplace. The author's insights into everyday learning can be applied to the museum environment, and also suggest that informal museum learning may have benefits for both school and work.

Reynolds, S.S. (1984) How to unstuff a museum: A preschool teacher's guide. *Curator,* 27(1), 59-64.

Reynolds, a pre-school teacher, describes the preparation process and tour of a natural history museum. She highlights the need to prepare students as well as parents, in order to make the most out of the experience.

Ripley, S.D. (1969). *The sacred grove: Essays on museums.* New York: Simon and Schuster.

Ripley discusses historical precedents for viewing museums variously as collections of treasures, attics of curiosities, showpieces for civic pride, centres for research and scholarship, or institutions for improving the cultural and educational development of the public. He urges museums to recognise their immense educational potential, and with respect to the public dimension of museums, submits that they provide an ideal setting for investigating the problem of how to create interest in human culture.

Roberts, L. (1997) *From knowledge to narrative.* Washington, DC: Smithsonian Institution.

This book reviews the history and application of the knowledge business in museums in The United States. Roberts discusses critical aspects of the transformation of the notion of knowledge. She argues that the gradual introduction of an educational voice into exhibit design helped redefine knowledge and changed the meaning of museums

themselves. The early orientation of museums presenting authoritative facts gave way to "narrative" where designers take the experience of visitors as a reference point.

Ruse, M. (1996). Changing knowledge, changing museums. *Museum International*, 48(2), **40-45.**

Ruse discusses two philosophies that underlie interpretations of the history of science as they apply to natural history and science museums: progressivism and post-modernism. This article should be of interest to museum staff who wish to think about the underlying philosophies of their own museum, and the ideas that they wish to portray to the public through their exhibits.

Sandifer, **C.** (1997). An examination of time-based behaviours at an interactive science museum: How much learning is really going on? *Science Education (Informal* ***Science*** *Education - Special Issue),* 81(6), 689-702.

Sandifer studied the time-based behaviour of 47 individuals during their visit to two interactive exhibits at a science centre in San Diego. The article reports careful research in the visitor study tradition, and is useful because it reveals very little overall behavioural differences between family and nonfamily groups visiting a science centre.

Schauble, L., & Partlet, K. (1997). Constructing a science gallery for children and familits: The role of research in an innovative design process. *Science* ***Education*** *(Informal Science Education - Special Issue),* 81(6), **--.**

The authors describe how research on learning informed every phase in the design of an innovative science gallery inside a large children's museum, during a five year collaboration to create a site where children could experience both casual and deep levels of science learning.

Schauble, L., Beane, D.B., Coates, G.D., Martin, L., & Sterling, P. (1996). *Outside the classroom walls: Learning in informal environments.* In L. Schauble & R. Glaser (Eds.), Innovations in learning: New environments for education. Hillsdale, NJ: Erlbaum.

This chapter highlights some of the unique features and some of the variation found in informal learning settings. Issues of studying learning in these settings involve: reorganising how we think about learning outcomes, focusing on the features of the setting that support personal growth, and examining the nature of the mediation of learning, both social and material. The authors propose that an examination of out-of-school learning would both enrich our understanding of learning and force a reexamination of the typical in-school environments.

Schauble, L., Leinhardt, G., & Martin, L. (in press). Organizing a cumulative research agenda: **A** framework for organizing a cumulative research agenda in informal learning contexts. *Journal of Museum Education.*

Schauble et al introduce a theoretical framework for research on processes of learning in museums. The framework is based on sociocultural theory, which emphasises that meaning emerges in the interaction between individuals and their social context. The authors propose three themes to guide their research agenda: learning and learning environments; interpretation, meaning, and explanation; and identity, motivation, and interest.

Screven, C. (1990a). Uses of evaluation before, during and after exhibit design. *ILVS Review,* 1(2), 36-66.

This article is an elaboration of Screven's concern that museums need to evaluate all steps in the process of exhibit development: planning, design, construction, installation, occupancy, and remedial. He discusses what evaluation is for at each stage, the misconceptions that he believes the museum community has about evaluation, and which methods are appropriate at each point in the process.

Screven, C.G. (1974). *The measurement and facilitation of learning in the museum environment: An experimental analysis.* Washington, DC: The Smithsonian Press.

Screven describes studies performed at the Milwaukee Public Museum in the early 1970's on the effectiveness of various interactive devices. He argues for the use of such devices for several reasons: they focus attention on specific learning goals; their goals can be measured according to instructional objectives; and , they can motivate visitors to learn.

Screven, C.G. (1984). Educational evaluation and research in museums and public exhibits: **A** bibliography. *Curator,* 27 (147-165).

Screven presents a bibliography of research on museums, with a special emphasis on educational studies. The bibliography is divided into two sections: the first containing articles originating from museums etc. and the second containing selected papers from outside the field (e.g. psychology and education). Individual articles are classified according to one or more of six categories: audience surveys, behaviour studies, experimental research, evaluation studies and methods, theory/method papers, and resource materials.

Semmel, M.L. (1992). The museum as forum: **A** funder's view. *The Public Historian,* 14(3), 77-83.

The article adds a new voice to the debate about what constitutes appropriate subject matter for humanities and history exhibits and museums. It also raises for the reader the question of whether, or to what extent, controversial topics can foster learning.

Serrell, B. (1996b). In search of generalizability: New tools for visitor studies. *Journal of Museum Education,* 21(3), 11-18.

Serrell describes a method for systematically tracking the duration **and** allocation of visitor time at museum exhibits. The author argues that agreed upon criteria need to be established for collecting observational data of visitors so that the findings are generalizable across studies.

Serrell, B. (1997). Paying attention: The duration and allocation of visitor's time in museum exhibitions. *Curator,* 40(2), 108-125.

Serrell's investigations took place in science, natural history, history, art museums, zoos, and aquariums. This article offers evidence about overall patterns of what and how much visitors attend to while at an exhibition.

Shettel, H.H. (1978). A critical look at a critical look: A response to Alt's critique of Shettel's work. *Curator,* 21(4), 329-345.

Shettel offers a point-by point defence against Alt's critique of his 1973 article in Museum News (Alt, 1977). His rebuttal arguments include stressing the importance of finding out the intentions of the exhibit creators and then empirically determining whether or not these intentions were realised in the visitors; and the importance of determining exhibit objectives while the exhibit development is ongoing. The article reveals the seriousness of the debate between these two researchers in the field of museum evaluation.

Shettel, H.H. (1973b). Exhibits: **Art** form or educational medium? *Museum News, 52(*1), 32-41.

Shettel, discusses the merits of using psychological and educational theory to evaluate and improve the educational effectiveness of didactic museum exhibits. According to Shettel, the essence of the museum experience lies in the visitor's experience with individual museum exhibits. He identifies three categories of exhibits: intrinsically interesting, aesthetic, and didactic exhibits, and offers several suggestions to improve the effectiveness of educational exhibits.

Silverman, L.H. (1995). Visitor meaning-making in museums for a new age. *Curator,* 38, 161-170.

Silverman uses the definition of meaning as a two-way communication between sender and receiver of information, to characterise the experiences of museum visitors. Instead of passively accepting the meanings intended by the institution, visitors fashion their own meanings, which are influenced by their sense of self, their sense of community, and the personal agenda which they bring to the museurn visit. Silverman calls for continued research to help ensure that museums remain relevant to the social, as well as the educational, needs of the public.

St. John, M,, Perry, D., & Huntwork, D. (1994). *Investments in informal science education: A framework for evaluation and research.* Inverness, CA: Inverness Research Associates.

This report is based on a 1992 meeting designed to bring leaders in science education together to rethink the role of museums in science education and the assessment of the quality and effectiveness of museum experiences. It illustrates that an examination of assessment first requires an examination of the very mission of informal science education. Museums serve as **part** of the national infrastructure to not only help people learn science, but also to develop a long term relationship with science. So instead of simply measuring learning, the authors suggest that assessment should **ask** about the value of museums in terms of their use, outlining criteria for assessment that includes design characteristics, actual use, user perceptions and satisfaction, and societal benefits.

Stanton, S. (1996). Considering gender in the pursuit of excellence and equity. *Journal of Museum Education,* 21(3), 23-25.

Stanton argues for greater attention to gender issues in both museum research and museum practice. This position paper speaks about the role of gender as it relates to learning.

Stevenson, J. (1991). The long-term impact of interactive exhibits. *International Journal of Science Education,* 13(5), 521-531.

Stevenson helped set up the interactive science and technology centre at London's Science Museum, and designed a study to investigate the long-term outcomes of visits by family groups. Based on Lockhardt's (1972) 'levels of processing' approach to memory research, Stevenson focussed on and analysed visitors' short-term and long-term memories to find evidence of deep cognitive processing that would suggest learning.

Stronck, D.R. (1983). The comparative effects of different museum tours on children's attitudes and learning. *Journal of Research in Science Teaching,* 20(4), 283-290.

Stronck examines the cognitive and affective results of tours in a natural history museum exhibit. The study examines if a more structured tour of an exhibit produces greater cognitive learning and positive attitudes among middle school students.

Sykes, M. (1995). *Research review on museum-based learning in early childhood.* Presented as **part** of the Learning in Museums Seminar presented by the American Association of Museums, Chicago, IL.

Sykes sets her review of research on museum-based learning in **a** framework based on the components of John Falk's and Lynn Dierking's Interactive Experience Model: personal context, social context, and physical context. She emphasises that any study of museum learning should be theoretically based and should encompass a range of learning experiences.

Tieken, N. (1991). Take a long look. *Museum News,* 70(3), *70-72.*

Tieken describes a labelling project, the goal of which was to increase the time visitors spent viewing artworks, and to enable visitors to view with understanding and purpose. The article is useful for drawing attention to the potential of labels for fostering visitor learning and to the value of taking a visitor-centred approach to interpretation.

Tuckey. C.J. (1992). Schoolchildren's reactions to an interactive science center. *Curator,* 35(1), 28-38.

Tuckey, reports results from a study of schoolchildren who visited an interactive science centre in Scotland. Data came from visual observation, questionnaires, and group interviews. This paper supports the social nature of a museum learning experience.

Tulley, **A.,** & Lucas, **A.M.** (1991). Interacting with a science museum exhibit: Vicarious and direct experience and subsequent understanding. *International Journal of Science Education,* 13(5), 533-542.

This article is useful for its identification of differences between males and females in their use of certain problem-solving behaviours, its focus on explanations that visitors provide after engaging with a museum exhibit, its descriptions of interview techniques and questions that were used, and its call for future, "deeper studies, perhaps of the 'thinking aloud' type".

United Nations Educational, Scientific and Cultural Organization. (1973). *Museums, imagination and education.* Paris: Author.

A collection of 11 essays by museum professionals from many countries. Some essays describe or recommend programs, some are histones of particular projects, and others discuss components of museum learning in theory. The final piece is a four-page history of the notion of museum education. One essay to note is a history of children's art programs, which traces themes in the need for and structure of activities directed at children within adult museums. The book also shows the importance that museum learning has for the international cultural community.

Vallance, E. (1995). The public curriculum of orderly images. *Educational Researcher,* 24(2), 4-14.

Vallance examines the idea that there is a curriculum inherent in the way in which images are presented and seen in art museums. Museums create "voluntary, public-access curriculum" which is then selected and seen differently by each visitor. The museum educator's challenges are: (a) attracting visitors to the museum; (b) providing an environment that encourages exploration; and, (c) translating between what visitors are seeing and the language they bring to the experience, e.g. help them make meaning from the stories in the artwork. Vallance provides a thought-provoking way to think about museums and how we shape our exhibits

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

This is a germinal collection of writings edited by some of the foremost interpreters of Vygotskian thought. Vygotsky's work is the foundation of what we call sociohistorical or sociocultural psychology. The essays presented here cover the basic tenets of the theory with respect to education and ontogeny. They explicate how culture relates to the development of cognitive structures, through social interaction, tool use, and leading activities.

Watkins, C.A. (1994). Are museums still necessary? *Curator,* 37(1), 25-35.

Watkins argues that if museums are to remain viable institutions, they must return to their original purpose of educating through objects. For Watkins, museums are places where substantive teaching and learning--that goes beyond arousing interest and curiosity--can occur if museums set clear teaching goals, mount exhibits that support these goals, and assess whether the goals have been reached. The article presents a forceful argument that the mission of museums is to teach through objects.

Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action.* Cambridge, MA: Harvard University Press.

Wertsch outlines a sociocultural approach to the development of "mind" based on Vygotskian theory and emphasizing in depth the related work of Mikhail Bakhtin. Wertsch, like Bakhtin, is interested in the specific mediating function of the language. He describes how we learn and reproduce culture by "ventriloquating" the voices in our environment, and how language is a link between culture and cognition.

Wertsch, James V. (1997). Narrative tools of history and identity. *Culture and Psychology*, 3(1), 5-20.

Wertsch discusses the role of narrative in the understanding and learning of history. History, in turn, is viewed as a critical element in the development of identity. Wertsch touches on many of the underlying assumptions and positions of sociocultural theory; he explicitly addresses the notions of cultural tools, of which history is a clear example. Parallels can be drawn between Wertsch's statements about history and the appropriation of a particular history, and statements about the function and role of museums.

Wittlin, A. S. (1971). Hazards of communication by exhibits. *Curator*, 14(2), 138-150.

Wittlin outlines some of the biological and cultural barriers to a museum exhibit's ability to impact visitors in the way planners intended. She describes two kinds of problem exhibits that work against optimal human brain and eye functions: those that contain intellectual overload and sensory understimulation, and those that consist of intellectual deficit and sensory overstimulation. In addition to biological problems, museums have to deal with two cultural hazards: underinterpretive exhibits and misinterpretive exhibits.

Wolf, L., & Smith, J. (1993). What makes museum labels legible. *Curator*, 36(2), 95-110.

Wolf and Smith undertook a study of the legibility of museum labels. Employing such variables as type face, type size, contrast, spacing, lighting and height, they tested four groups of subjects: low-vision, elderly, low-vision/elderly, and museum curators.

Wolins, I. S. (1990). Teaching the teachers. *Museum News*, 69(3), 71-75.

Wolins describes the learning model that was developed for docents, in order to teach them how to engage the public in active learning. Docents received one on one instruction from expert docents, to enable them to sequentially master the skills required *to* conduct a tour before taking on the task of leading a complete tour.

Worts, D. (1991). Visitor-centered experiences. In A. Benefield, S. Bitgood, & H. Shettel (Eds.), *Visitor studies: Theory, research and practice*, Volume 4 (pp. 156-161). Jacksonville, AL: Center for Social Design.

Worts describes a research and development project designed both to understand how people derive meaning from their experiences with art objects and to develop new interpretive techniques for exhibits that strengthen visitor experiences. Educators, museum professionals, and consultants developed a theoretical model for Optimal Museum Experiences, which takes into account not only features of an exhibit that constitute the museum's presentation but also features that reflect individuals' personal responses to the art.

Wright, E. (1980). Analysis of the effect of a museum experience on the biology achievement of sixth graders. *Journal of Research in Science Teaching*, 17(2), 99-104.

Wright conducted this study by administering a pretest, and a posttest after a standard three hour visit to the museum or after a three hour review session in the classroom. Analysis of test results showed that students who visited the museum showed superior achievement on the test. Wright concludes that this result supports the notion that

multisensory, hands-on experiences provide concrete ways for students to assimilate concepts.

Yenawine, P. (1988). Master teaching in an art museum. *Journal of Museum Education*, 13(3), 17-21.

Yenawine discusses the importance of having great teaching in art museums. He identifies four major variables necessary for a successful learning experience in an art museum: teaching style, knowledge of the audience and its needs, an appropriate site for the learning to take place, and the information and skills imparted. He argues for the importance of teaching "visual literacy" in art museums. Visual literacy will teach observers how to view art from a variety of perspectives and is best taught from the best and most complex works of art available using a variety of teaching styles.

Zeller, T. (1987). Museums' and the goals of art education. *Art Education*, 40(1), 50-55.

Zeller reviews innovative educational programs offered by over 30 art museums across the United States, recommending increased opportunities for students to participate in school-museum interaction, with museums becoming an integral rather than supplemental part of the art curriculum. The innovative art museum educational programs he highlights involve museum-school partnerships that use interactive programs, engage students in games and activities, call for participation and judgment, stimulate creativity, and explore multi-disciplinary connections involving multiple media (dance, music, computers, etc), often in a sequence of museum visits. Zeller concludes with specific recommendations for how art educators can integrate art museums into the curriculum.